

Social Studies

Part-I

(Geography & Economics)

For Class X



ਇਹ ਪੁਸਤਕ ਪੰਜਾਬ ਸਰਕਾਰ ਦੁਆਰਾ ਮੁਫਤ
ਦਿੱਤੀ ਜਾਣੀ ਹੈ ਅਤੇ ਵਿਕਾਊ ਨਹੀਂ ਹੈ।



Punjab School Education Board
Sahibzada Ajit Singh Nagar

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Preface

Punjab School Education Board, since its inception has been actively engaged in the preparation of the text books based on new syllabi. On the direction of Education Policy 1986, 10+2+3 pattern of education has been implemented. While taking into consideration, the recommendations of National Policy of Education, a number of changes have been introduced in the syllabi of classes IX and X. A sincere effort by Punjab School Education Board has been made to bring the syllabi of social studies at par with national pattern of education, to enable the students of Punjab to remain conversant with national curriculum.

Under the new education policy of Punjab School Education Board, from the year 1997, the syllabi of social studies have been revised, keeping in view the economic and social changes. Along with History, Geography and Civics, the study of Economics was included in the subject of social studies. The Punjab School Education Board has been publishing two separate books for the study of social studies. Social Studies Part I book deals with the study of Geography and Economics. Social Studies Part II includes the study of History and Civics.

I am sanguine that the study of these books will enable the children to develop a 'thinking mind' and help in their mental development. An effort has been made that these books prove to be useful for both teachers and students from every point of view.

The book in hand is of Social Studies Part I and has been translated in English. Suggestions for the improvement of the book are welcomed.

Chairman

Punjab School Education Board.

ਸਮਾਜਿਕ ਨਿਆਂ, ਅਧਿਕਾਰਤਾ ਅਤੇ ਘੱਟ ਗਿਣਤੀ ਵਿਭਾਗ, ਪੰਜਾਬ

About the Geography Part of the Book

This book is based on the study of Geography of India. An effort has been made to make the study of geography simple, interesting and useful. The contents of this book have been developed by using simple language, maximum maps, graphs and line sketches to enable students understand the content matter without any difficulty. Every possible effort has been made to include latest statistics and geographical information of Punjab as well, in this book.

I am sure that the students and teachers will appreciate the contents of this book.

Co-ordinator (Geography)

About the Economics Part of the Book

From the admission year 1998, the Punjab School Education Board included the Economics subject in Part-2 of this book for the 10th class students under the subject of Social Studies. Like the 9th class syllabus of Economics, the 10th class syllabus of Economics is also in accordance with the syllabus of N.C.E.R.T., New Delhi. The first chapter of “Basic Concepts” has been included in this Part so that the students don't face any kind of problem in understanding the other chapters.

This part of the book is divided into six chapters. It provides brief knowledge about the different aspects of the Indian Economy, like the infrastructure of the Indian Economy, the development of Agriculture, Industries, Foreign Trade and Economic Planning in India. In this Part the facts have been explained with the help of statistical data and tables given at proper places.

It is hoped that this Part of the book will fulfil the needs of the teachers and students in all respects. However, efforts will be made to include any kind of suggestions from the field in the next issues of the book.

Co-ordinator (Economics)

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PART - A
GEOGRAPHY

CHAPTER I

INDIA – An Introduction

On examining the globe carefully, we could locate a huge landmass of triangular shape, in the Indian Ocean. This landmass is none other than your own country, India, which gave its name to this Indian Ocean also. Surrounded from three sides by the Indian Ocean and in the north by the high mountains of Himalaya, India is a vast country of great capabilities. It ranks second after China in terms of population and seventh in terms of area in the world.

This huge landmass and populated country of south Asia, which is known for its old tradition is gradually entering into the changing world. Its size is so huge from east to west that when there is sunrise in the east i.e. Arunachal Pradesh, then in the west i.e. Saurashtra region of Gujarat, there is still night. Due to the variability of temperature, a wide variety of crops can be grown here.

This country of hundred crore population is comprised of almost 6 lakh villages and 5 thousand towns and cities.

Making republic, secularism and socialism as a basis of its national policy after its independence, it attracted the attention of the world community. Today India is the largest Republic country of the world. In the middle of the 1960's, it again, stunted the whole world by the tremendous increase in foodgrain production through "Green Revolution". Now it has strong agricultural and industrial base. Today the foreign capital investors are very much eager to invest their capital in the Indian economy. It had made a tremendous progress in the space technology.

But, besides these achievements, there exist many black spots. In India, highest number of world's illiterates reside. More than one third of the country's population is living below the poverty line. It has great social, political and economic inequalities. On the one hand in Kerala, 9 out of 10 females are literate. But in Bihar on the other extreme, this average is just 3 out of 10. Situation of economic inequalities is indicated by the fact, that 20 percent people of high class share 50 percent share of national income, whereas, 70 percent people belonging to lower strata poor state have just 20 percent share in the national income.

Would you like to know more about your country which is full of diversities and inequalities? How the people of India have used or misused its land, water and air resources and what are their regional patterns, is not only an important thing to know but also a subject of intensive discussion.

To search for the answers of these questions would not only be interesting for the student of geography but is also compulsory from the geographical point of view. A systematic detailed description of various elements of geography of India has been given in the proceeding pages. But before that, the general introduction of India has been given, in which a brief description about name, situation, regional or locational extent and socio-economic setup has been dealt with.

Many concepts related to the name of India are found in the ancient literature. According to that, its first name was 'Himalaya – Shet – Prayatani', which means a country between Himachal and Rameshvaram. Secondly, due to its occupation by the Aryan people, this region was also known as the 'Aryavarta'. Thirdly, after the name of 'Bharat' a strong king, who was the son of king Dushyant and Shakuntala, this country was named as 'Bharat'. Fourthly, its recent name 'India' has been taken from the north-west flowing river 'Sindhu' by the Aryan people of vedic age. The people of its neighbouring country Iran pronounced this 'Sindhu' as 'Hindu'. The people living around this river became the residents of 'Hindustan'. The Greeks converted this word 'Hindu' into 'Indos'. After reforming this word, the Romans named it as 'Indus'. In this way our country is called by different names as 'India', 'Hindustan' and 'Bharat'.

Situation

India is a giant country which extends into the south of the continent of Asia. It has a triangular shape due to the great mountainous wall of Himalayas in the north and Indian Ocean in south. It also has Arabian Sea on its one side and Bay of Bengal on the other side. Due to its location in the eastern hemisphere, it is counted among the eastern countries. The inter-national sea routes passing through the Indian Ocean connect India to the developed countries (European and American) of west on one hand and on the other with east and far-east countries of China, Japan, Indonesia and Australia. Except these, trade relations through sea route are also emerging with Africa and middle-east countries. Its trading importance also increased after the opening of the suez canal. This canal has reduced the distance by 4800 kilometres between India and parts of western Europe. In this way India has central location in the Indian Ocean. Only due to its central location, it could on the one hand oppress the militancy, which is operating in Sri Lanka and Maldives and on the other protect ocean highway men/robbers in the last decade to the other hand by utilizing its powerful navy and ultimately helped to restore peace. That is why India has important place in the group of 'SAARC' countries. Table 1.1 represents some important data about SAARC nations. This clearly reflects the importance of India in terms of area and population.

Table 1.1 SAARC COUNTRIES : A COMPARISON

S. No.	Country	Area Sq.Km.	Polulation In Lakhs (2018)	Currency	Per Capita GDP (In American Dollars)	Capital City
1.	India	32,87,263	1,35,26	Rupee	1,940	New Delhi
2.	Pakistan	8,81,913	21,22	Rupee (Pak)	1,548	Islamabad
3.	Nepal	1,47,181	2,80	Rupee (Nepal)	835	Kathmandu
4.	Bangladesh	1,47,570	16,13	Taka	1,517	Dhaka
5.	Bhutan	38,394	7.5	Ngultrum	3,110	Thimphu
6.	SriLanka	65,610	2,12	Rupee (Srilanka)	4,065	Colombo
7.	Maldives	298	5.1	Rupee (Maldives)	10,536	Male
8.	Afghanistan	6,52,237	3,71	Afghani	586	Kabul

Locational Extent

India extends between 8°4' and 37°6' north latitude and 67°7' and 97°25' east longitude. The Tropic of Cancer divides the country into two parts the northern and the southern. According to area, north India is twice as big as south India. If we draw a straight line from Kashmir in the northern end to Kanyakumari, in its southern edge, its length would be 3214 kilometres. This distance would represent the latitudinal difference of 292' on land, which would be nearly 1/3 of the northern hemisphere. Similarly, from the east situated Arunachal Pradesh to the western frontier, the Rann of Kuchchh, there exists 29°12' longitudinal difference which is equal to 2933 kilometres distance. Due to this difference only, there is sunrise in Arunachal Pradesh, and Gujarat has still two hour left of the night.

Due to the great longitudinal and latitudinal extent it is also called as a sub-continent. Sub-continent is a big and independent region, whose land frontiers are formed by different physical features, which differentiate it from its surrounding regions. India is separated from Tibet in the north by the Agill, Muztgh, Kunlun, Karakoram, Hindukush and Zaskar mountain ranges beyond Himalayas; in the south by Sri Lanka through Palk strait, and the Gulf of Mannar; in the east by Arakanyoma which separates it from Myanmar (Burma) and in the west by Pakistan through the great Thar desert. Because of its huge area different cultural, economic and social diversities are found in India. But,

irrespective of this, there exist unity in the country, in terms of climate and culture etc.

Size and Area

The shape of India is a triangle whose base is in north and top towards the south above Kanyakumari. It is not too big and not too small in terms of area. Total area of our country is about 3287263 sq. km, which is 2.2 per cent of the world total area. In this way, according to area, India is seventh largest country of the world. The other six nations are Russia, Canada, China, United States of America, Brazil and Australia respectively. In comparison to big countries, it is just equal to the about one-seventh part of Russia and one-third part of Canada. Whereas it is twelve times bigger than from England and eight times bigger than Japan in comparison to small countries.

Neighbouring Countries

Seven nations are having common land frontiers with India. To its north-west and north, Pakistan, Afghanistan, China and Nepal are its neighbouring countries and Bhutan, Myanmar (Burma) and Bangladesh are frontier countries in the north-east.

Political Setup

Prior to Independence, India was divided into 562 small princely states and 9 British Provinces. After getting Independence on 15th August 1947, an effort was made to merge small states in the adjoining states. A State's Reorganisation Commission was constituted in 1953 to reorganize boundaries of the states on linguistic basis. In this way, whole country was divided into 14 state and 6 union territories. Afterward, these divisions lead to the formation of many states, which were given new names and many union territories were provided with the state status. Today's, Punjab also came into being after the recommendation of Shah Commission, as a Punjabi speaking state on 1st November 1966.

Present day India comprises 28 states and 7 centrally administered territories. States and their capitals are shown in the following table and map.

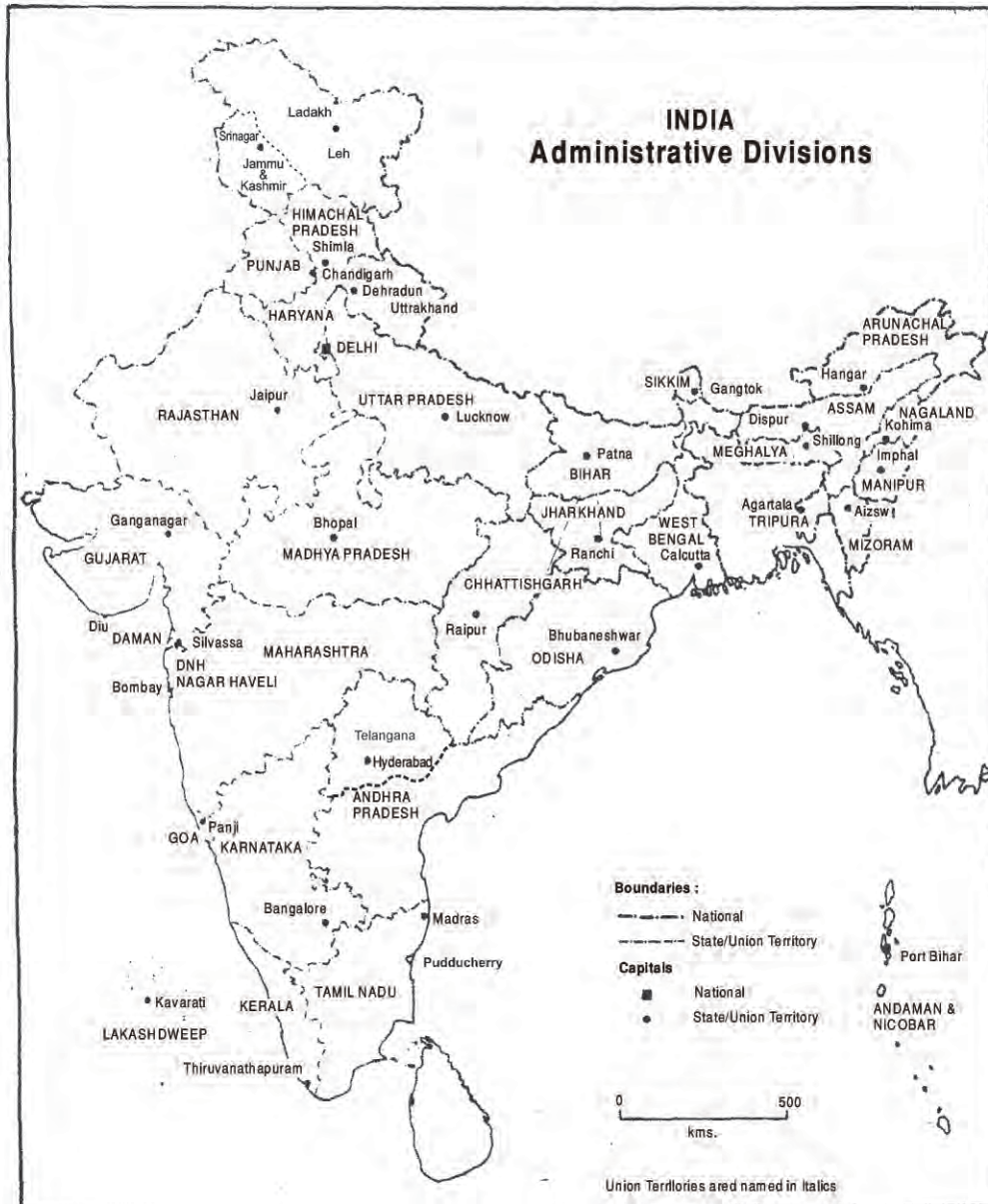


Table 1.2 : Features of Indias Population, 2011

S.No.	Name of state	Capital	Area (Sq. Km.)	Total Population	Density (Persons per Sq. Km.)	Literacy rate (Percent)
	INDIA	New Delhi	32,87,240	1,21,01,93,422	382	74.04
	(i) STATE					
1.	Andhra Pradesh	Hyderabad	1,60,205	4,93,18,668	306	67.84
2.	Arunachal Pradesh	Itanagar	83,743	13,82,611	17	66.95
3.	Assam	Dispur	78,438	3,11,69,272	397	73.18
4.	Bihar	Patna	94,163	10,38,04,637	1102	63.82
5.	Chhattisgarh	Raipur	135,191	2,55,40,196	189	71.04
6.	Goa	Panaji	3,702	14,57,723	394	87.40
7.	Gujarat	Gandhi Nagar	196,024	6,03,83,628	308	79.31
8.	Haryana	Chandigarh	44,212	2,53,53,081	573	76.64
9.	Himachal Pradesh	Shimla	55,673	68,56,509	123	83.78
10.	Jharkhand	Ranchi	79,714	32,966,238	414	67.63
11.	Karnataka	Bangalore	191,791	6,11,30,704	319	75.60
12.	Kerala	Trivandrum	38,863	3,33,87,677	859	93.91
13.	Madhya Pradesh	Bhopal	308,245	7,25,97,565	236	70.63
14.	Maharashtra	Mumbai	307,713	11,23,72,972	365	82.91
15.	Manipur	Imphal	22,327	27,21,756	122	79.85
16.	Meghalaya	Shillong	22,492	29,64,007	132	75.50
17.	Mizoram	Aizawl	21,081	10,91,014	52	91.58
18.	Nagaland	Kohima	16,579	19,80,620	119	80.11
19.	Oddisha	Bhubaneshwar	155,707	4,19,47,358	269	73.45
20.	Punjab	Chandigarh	50,362	2,77,04,236	550	76.68
21.	Rajasthan	Jaipur	342,239	6,86,21,012	201	67.06
22.	Sikkim	Gangtok	7,096	6,07,688	86	82.2
23.	Tamilnadu	Chennai	130,058	7,21,38,958	555	80.33
24.	Telangana	Hyderabad	1,14,840	3,53,46,865	310	67.22
25.	Tripura	Agartala	10,486	36,71,032	350	87.75
26.	Uttrakhand	Dehradun	53,483	1,01,16,752	189	79.63
27.	Uttar Pradesh	Lucknow	2,40,928	19,95,81,477	828	69.72
28.	West Bengal	Kolkata	88,752	9,13,47,736	947	77.08

(ii) UNION TERRITORIES

1. Andaman and Nicobar Islands	Port Blair	8,249	3,79,944	46	86.27
2. Chandigarh	Chandigarh	114	10,54,686	9,252	86.43
3. Dadra and Nagar Haweli	Silvassa	491	3,42,853	698	77.65
4. Daman and Diu	Daman	112	2,42,911	2,169	87.07
5. Delhi (N.C.T.)	Delhi	1,483	1,67,53,235	9,340	86.34
6. Lakshadweep	Kavarati	32	64,429	2,013	92.28
7. Pudducharry	Pudducharry	479	12,44,464	2,598	86.55
8. Jammu & Kashmir	Srinagar, Jammu	2,22,236	1,25,48,926	56	68.47
9. Ladakh	Leh	(combined)	(combined)	(combined)	(combined)

Source : *Census of India (2011) : "Provisional Population Statistics", India Series-1, Paper of 2011, India Registrar General and Census Commissioner, India, New Delhi.*

India is the largest Republic, which was setup on 26th January 1950. In this, President is the head of country who is elected by the representatives of Parliament and States for a duration of five years. Indian Parliament is divided into two houses - the upper and the lower. Upper house is known as Rajya Sabha and lower house as Lok Sabha.

Population Profile

India ranks second only to China according to population in the world. Here, on the 2.2 per cent area of the world, 16.7 per cent of the world's population lives. According to 2011 census, its total population was 121.01 crore, with 62.4 crore males and 58.6 crore females. In this way according to the 2011 census, its population density is 382 persons per square kilometre. Only 74.04 per cent persons are literate the gender-ratio, as per 1000 males there are just 940 females.

India's population is increasing at a fast rate. According to estimates, every year there is an increase of almost 2 crore persons, which is more than the total population of Australia.

Regional Diversity: Due to its vast expanse, many diversities exist in India. That is why, many a times it is also known as the 'Land of Diversities'. These diversities exist due to the presence of, mainly four elements:

1. Huge Expanse : Due to its great east-west and north-south expansion, existence of diversities is but natural. It is called as the sub-continent only due to its regional expansion. Differences can easily be seen in every sphere of its natural or physical and human elements.

2. Relief : In India, where on the one hand oldest Aravalli Mountains of the world are found, there also exist young Himalayan Mountains. Similarly, there is peninsular plateau formed of hard and old rocks in the south and at the same time we find huge and fertile plains of Satluj – Ganga –Brahmputra made

by the newer soils brought down by the rivers originating from the Himalayan mountain ranges.

3. Climate: (a) The Tropic of Cancer passes through the centre of India and the area to its north has temperate type of climate. Most of this being far from the sea, comes mostly under the influence of continental type of climate. However, areas to the south of the Tropic of Cancer, being nearer to the Equator are under the influence of tropical type of climate. Surrounded by sea from the three sides, temperature here is always less than 40°C, due to which hot and maritime type of climate prevails in the Deccan Plateau region.

(b) The north-east receives more rainfall than the west. While Cherrapunji is counted among the world's highest rainfall receiving places, there also exists dry region of Thar desert in extreme west of India.

4. Migration : People of different tribes, castes, religions, soldiers, and rulers from neighbouring and outer world countries have been coming from different routes and settling in India from thousands of years. We could find different groups of people. For example Mongolian tribes came through China from middle-Asia and north-east regions; Tibetan people came in through northern west. Himalayan region; Aryans and Muslims came through Khyber and Bolan passes from western Asian region and settled in north-western plain areas; Dravidians settled in plateau areas of south India and Tamils came from Sri Lanka and settled in Tamil Nadu.

5. Culture : Due to different ethnic and religious groups, found in different regions of India, we find clear diversity in terms of language, life style, dress, eating habits, architecture, folk songs, folk dances, fairs, festivals and customs etc. Almost 187 languages are found in India, out of which only 23 languages are spoken by 97 per cent people of the country. However, major Indian languages recognised by the constitution are 22 in number. In regard to folk-dances, Bharat Natyam, Kathakali, Kathak, Kuchi-pudi and Manipuri developed in the South, north and north-eastern parts of the country. In relation to religion, Jainis are found mostly in Saurashtra, Buddhists in Himalayan areas, Sikhs in Punjab, Muslims in Kashmir and Telengana and Christians in north-eastern parts.

As regards agriculture, due to availability of the great alluvial fertile plains in the north, alongwith mechanization, regular water supply management and developed transport etc. agriculture has developed on modern lines. On the other hand, shifting (subsistence) agriculture is still being practised in dry (arid) Rajasthan, middle Vindhya and Maikal mountainous region, Chota Nagpur plateau, and north-eastern hilly areas of the country. Different groups of tribal population of these areas have varied customs and cultures.

Unity in Diversity

Above mentioned elements prove that India is a country of diversities. Variations are found in its physical, economic, social and cultural elements. But

irrespective of these variations, unity prevails in the Indian society. Following elements describe the unity in diversity in the country: -

(1) Monsoon Season

Our country has tropical monsoonal climate with agriculture as the main occupation, in which there is almost uniform sequence of seasons. Most of the rainfall in the country comes in the summer season. That is why agriculture and economy of the entire country depends on the onset or coming of monsoons. These winds provide water to the agricultural land of the great plains. They also help by making electricity supply certain which is generated in water reservoirs in hilly areas. In this way these winds are a great boon to life in the urban and rural areas. That is why entire population of the country eagerly waits for the monsoon winds.

(2) Religion and Culture

(a) Religious places: India is a country of many religions and devotees of these religions are scattered in different parts of our country. But these religious places being the centres of spiritual power have at different times joined thousands of people living at different places and helped to inspire the feeling of unity through religious integrity. Hindu devotees from every corner of the country visit the religious places as Jagan Nath puri, Kashi, Badrinath, Amar Nath etc. for worship. Similarly large number of people from Muslim religion visit places like Shrine (Mosque) of Khwaja Chisti at Ajmer, Jama Masjid and Bibi Ka Maqbara at Delhi for prayers. Devotees of Sikh religion come from all over the country to the places like Harimandir Sahib at Sri Amritsar Sahib, Ponta Sahib, Hemkunt Sahib, Hazur Sahib (Nandedh) etc. But an interesting thing to note here is, that whether it's a temple of Hindu Gods and Goddesses, mosques of Pir-Faqir or Gurudawara's of Sikhs, people of different religions could be seen together at any one place, offering the prayers which is a strong sign of unity.

(b) Religious Saints: Besides religious places, religious Gurus, Pirs, Prophets, Sufi Saints etc. through their spiritual meetings and preaching provide strong base to the cultural integrity by generating brotherhood and communal harmony. Saints like Kabir, Guru Nanak, Tuka Ram, Surdas, Chisti, Ramanuj in every part of the country through the message of unity and religious feelings strengthened the movement of cultural integrity. Guru Arjun Dev included the writings of sufi saints of different religions in the Holy Guru Granth Sahib and established a new religious movement.

(c) Language and Art: Language plays a precious role in cultural communication and dispersal in different parts of the country. During the Vedic age, hymns were spoken in Sanskrit language only. The reason behind the impact of Vedas and Puranas from Kashmir to Sri Lanka and from Rajasthan to Manipur was that, their publicity was through the Sanskrit language. Even today, the base of all regional languages is Sanskrit. During medieval times Persian

language was in the full vogue. Sultans of Delhi recognized a new language Urdu which was the mixture of Persian and Sanskrit, all over the country. Till today this is known as Hindustani language. After independence, Hindi was given the status of national language and English was considered as the link language. Now, tri-language Agreement prevails in India. According to which Hindi would be National language, English would work as the link language and in various regions efforts would be made to develop and popularize the local regional languages. But actually importance is being given to the use of English language. Although only two per cent people of the country know and understand English properly. In this kind of a situation maximum loss and difficulty is faced by the tribals. Because in most of the states, school education is not provided in their mother tongue. They had to learn firstly their regional language, then national and link language Hindi and ultimately English. That is why tribal population (or people of tribal areas) had to cover a long distance of the knowledge of language to come in the main stream of the country.

According to the folk tales, folk songs sung in relation to monsoon at different places are almost the same. As for instance, Tij in Punjab, Savan in Haryana, Kajri in Bhojpur and Malhar in Braj etc. Besides this, organizing Ballads, folk dances, music and plays under folk arts in different fairs, festivals and fete's through inter-exchange, are developing the feeling of unity in the country. Also the Indian movies, not only in entire India but also in its neighbouring countries are putting strong impact of the great Indian civilization and culture.

(d) Means of transport and communication: Development of these means had played an important role in joining the different parts of the country. Railways and Roadways by connecting villages with the towns and difficult hilly areas with the developed centres had removed the regional hurdles which came in the way of marketing goods in economy. In this way, due to the establishment of economic and social linkages people are joining the national stream and not ibkt the regional trend. Development of Doordarshan (television), Newspapers and Magazines have strengthened the national thinking.

(e) Migration: No doubt with the migration of villagers to the urban areas and with their settling in the towns have given birth to the slums near urban centres but coming in contact of people of different religious and social groups, has strengthened the feeling of brotherhood and unity.

In addition to the above mentioned elements, the central government is providing jobs to the people of different regions in public and defence services. They are transferred to different regions of the country during their job tennure. This ends regional and individual narrowness and strengthens the feeling of national unity. Similarly, one constitution, one head of the forces, one currency and democratic system etc. in the country have strengthened the feeling of unity in the country.

In this way, we may say that inspite of great diversities, unity is there, and these two are not opposite to each other but are closely related and both provide strength to the spirit of national unity. National unity is not just a specific religion or special class or caste but is a mixed form of various cultures spread over India.

Exercise

I. Answer the following questions objectively :

1. What is the basis of naming Bharat as 'India' ?
2. What is the situation of India on the globe ?
3. What is the location of India in respect of Indian ocean ?
4. What is the extent of India ?
5. What is the North-South and East-West extent of India ?
6. What is the length of land and coastal boundaries of India?
7. What is the rank of India in the world in terms of area ?
8. When was the Present Punjab State Created ?
9. What is the present administrative division of geographical set up of India?
10. Name the largest and smallest States of India in terms of area and population.

II. Answer the following questions in short :

1. Is India a sub-continent ?
2. What type of cultural diversities are found in India ?
3. Write a note on India's land extent.
4. What is the contribution of Indian languages and art to the unity in diversity of India?
5. Describe India's regional diversity through any two facts.
6. Eleborate India's unity in diversity in any two factors?
7. What has been the contribution of natural diversity towards cultural variations in the country ?
8. "When the sun is rising in Arunachal, there is still night in Gujrat" Explain.

III. Answer the following questions subjectively :

1. How does India got its name ? Describe in detail its size and administrative divisions.
2. What is the impact of India's geographical location on its security, climate, trade and culture ?

3. "India is country of diversities" ? Explain the statement.
4. Which factors influence the regional disparities found in India ?
5. Which factors are responsible for maintaining India's unity in Diversity ?

IV. Show the following facts on the map of Indian sub-continent :

1. India's neighboring countries (with different colours).
2. Oceanic regions adjoining India (with names).
3. States, Union territories and capitals of states of India.
4. Runn of Kuchchh, Kanyakumari, Arunachal Pradesh and Srinagar.
5. States and their capitals, adjoining Bangladesh.
6. New Moor Island, Diu, Lakshadweep, and Indira Point.

CHAPTER 2

LAND

After the brief introduction about the country, we shall be getting a detailed information about its relief features.

The relief of India is not even everywhere. In the north, there exist the Himalayan mountains and the great plains formed by rivers. In its south, there exists a plateau which is formed by the old rocks. Being old, this triangular plate has played a very important role in the formation of the landforms of India. All other physiographic features of the country came into existence after the formation of this plate. That is why this peninsular part is also called the centre of Indian Geology. The coastal plains are formed on the three sides of this plate along the sea-coasts. In addition to these, many island groups are found in the ocean regions.

According to the estimation of the census commissioner of India, the division of physical units of the country's total area is as follows:

Mountains: 10.7 per cent, Hills: 18.6 per cent, Plateau: 27.7 per cent, Plains: 43.0 per cent

The surface of India is mainly divided into five parts at the macro level (see Model 2.1): -

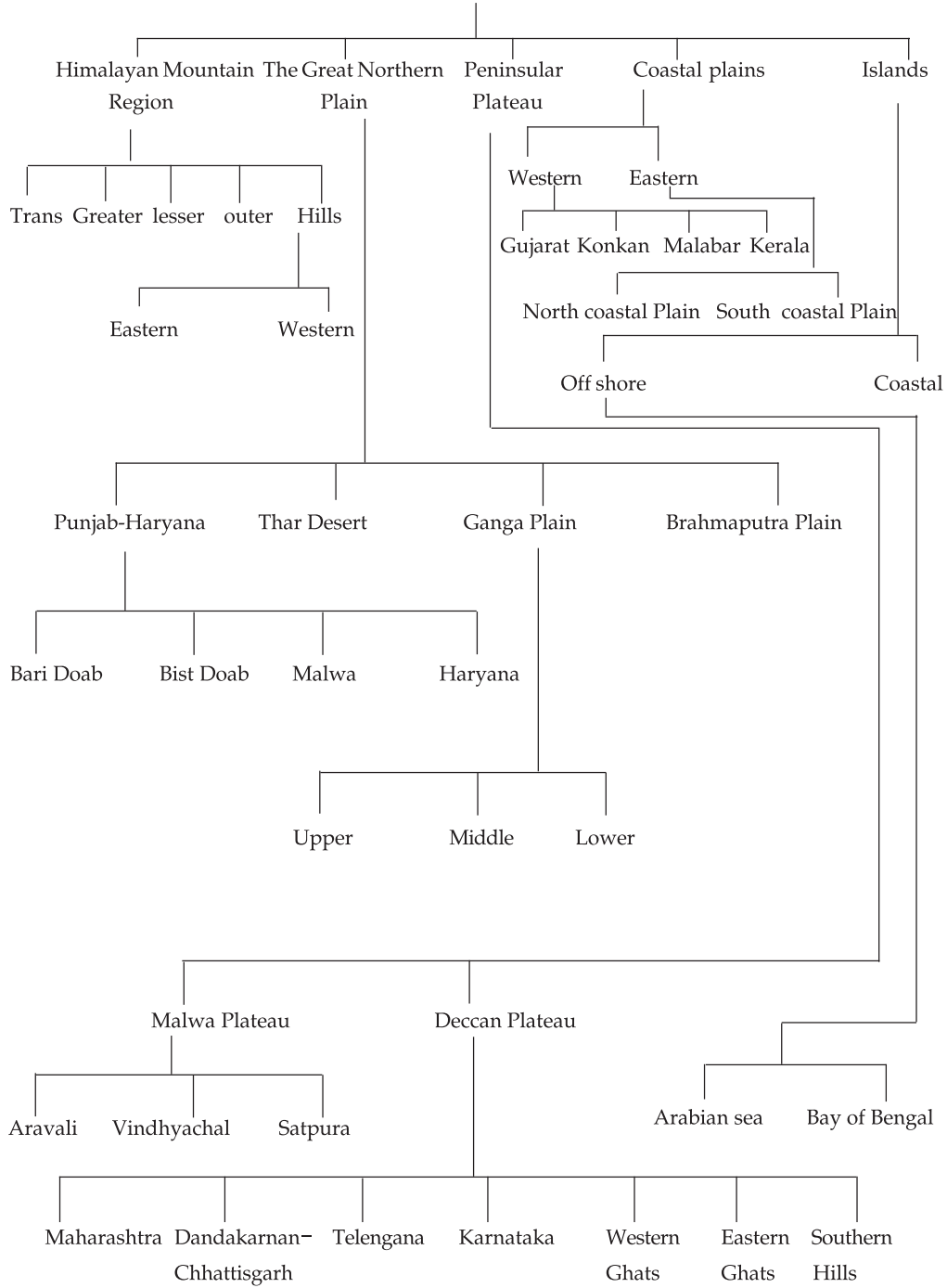
- (I) Himalayan Mountainous Region
- (II) The Great Northern Plain
- (III) Peninsular Plateau Region
- (IV) Coastal Plains
- (V) The Indian Islands

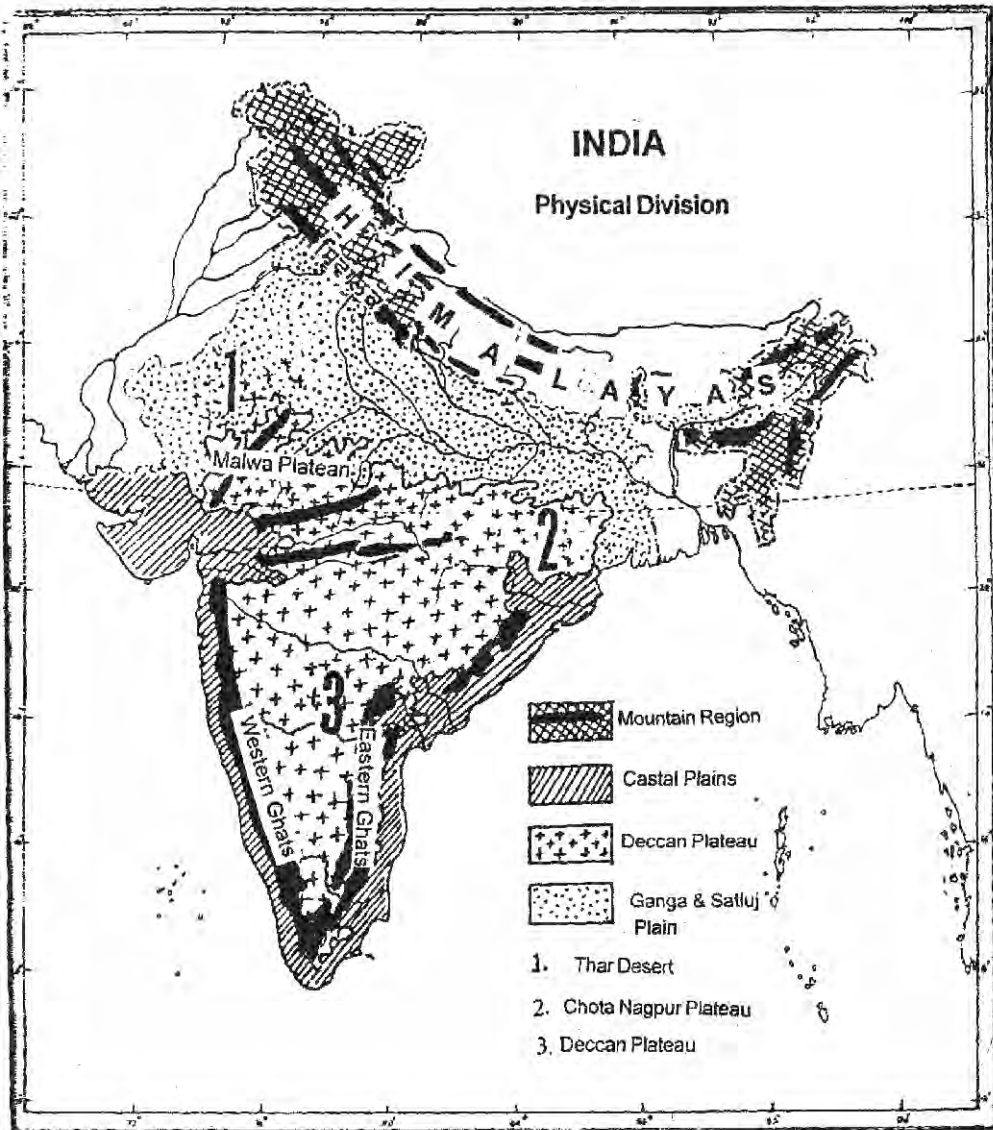
(1) Himalayan Mountainous Region

(A) Extent: Running in an east-west arced curve, the Himalayas form India's northern frontier. This great mountainous region extends for about 2400 km from Arunachal Pradesh in the east to Jammu and Kashmir in the west. Its width varies between 240 km and 320 km. The total area of this region is 5 lakh km² and average height is about 5100 metres or 17000 feet.

(B) Origin: - These mountain ranges began to be uplifted about 400 lakhs years ago. At the present site of the Himalayas there was a sea of Tethys and on sea bed sediments were deposited which were brought by the then rivers from the Tibetan plateau in the north and Gondwana land (Deccan Plateau) in the south. Due to the internal forces of the earth both the plates started moving towards each other. As a result folds occurred in their sediments and their height increased. These mountains are still rising. Due to the great heights, these young folded mountains are snow covered as 'Himalayas' or Him wala. These mountains are also known as the 'Himvan' or Himadri' or Himachal'.

Model 2.1: Classification of India's Physical Divisions





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(C) Shape:- The shape of the Himalayas is like a convex curve towards our country, whose middle portion is curved till the Nepal border. Many a times it looks like a bow which has threads on its two ends in the form of mountains, reaching on one side from Safed Koh, Suleman and Kuithar to Arabian sea in the north-western part and to the other side in the north-eastern part, going upto the Bay of Bengal, along Indo-Burma hills from Arakanyoma to Tenasserim mountain ranges. Try to see the extent of these mountain ranges in your Atlas.

(D) Slope: - Slope of these mountain ranges in south towards India is very steep, whereas it has gentle slope towards China in the north. That is why it is difficult to cross these from the south. Due to steep slope and height, waterfall and narrow river valleys are found mostly on the southern slopes. They provide water to the rivers of north India, throughout the year, which is a natural boon to the great plains of India.

(E) Classification: - The Himalayan complex can be sub-divided on the basis of height into the following five sub-divisions from north to the south:

- (I) The Trans Himalayas
- (II) The Great Himalayas
- (III) The Lesser Himalayas
- (IV) The Outer Himalayas
- (V) Off - Shoots.

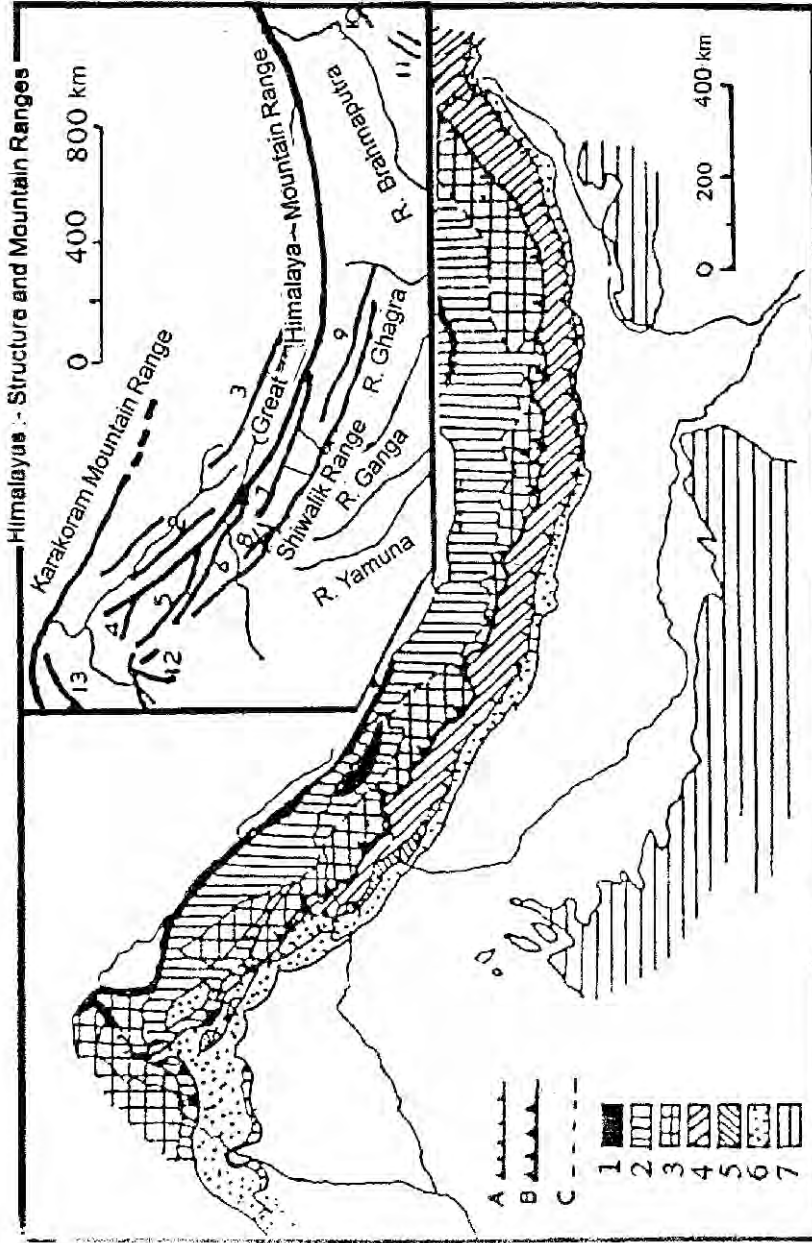
(I) The Trans Himalayas

These great ranges of the Himalayan mountains extend from the Pamir Knot in the north-west of India towards north-east parallel to each other. These are also known as 'Tibet Himalaya' because most of these fall in Tibet. Their total length is 970 kilometres. Their width at the ends is 40 kilometres while in central part, the width is almost 222 kilometres. Their average height is 6100 metres. The important mountain ranges are Zaskar, Karakoram, Ladakh and Kailash. This mountainous region is famous for high and folded peaks and for huge glaciers. Mount K2 Mount Godwin Austin (8611 metres) is the highest peak of this region and is second highest peak of the world. Hidden Peak (8068 metres), Brand Peak (8047 metres), Gaysherboom (8035 metres), Racka-Pashi (7788 metres), and Harmosh (7397 metres) etc are its other important peaks. Hispar and Batugh (57 Kilometres) and Beacko and Baltoro (60 kilometres) are the famous glaciers of this range.

(II) The Great Himalayas

(a) Name: This part of Himalayan region is also known as Himadri, or Inner Himalayas or the central Himalayas.

(b) Extent: This sub-division is the longest and highest mountain range of the country which extends from the deep Gorge of Indus river in the west to the Dihang Valley of the Brahmaputra river in the north-east. These mountains are



A. Main Rift Boundary B. Main Central Rift C. Northern Boundary of Himalayas.
 1. Rift 2. Tibet Himalaya 3. Great Himalaya 4. Lesser Himalaya 5. Contol Neppe 6. Sub-Himalaya 7. Indian Hard Lard
 1. Ladakh Range 2. Zaskar Range 3. Kailash Range 4-9 Middle Himalayan (lesser) Ranges 10-11 Garo-khasi
 12. Nanga Parbat 13. Hindukush

composed of the Archean era's crystalline metamorphic rocks like granite, gneisses and the schists of old geological ages.

(c) Size: The length of this mountain range is 2400 kilometres and average height is 6000 metres or 20000 feet. Its breadth ranges from 100 to 190 kilometres.

(d) Summits/peaks: Some of the highest peaks of the world are situated in this range. The Mt. Everest (8848 m.) is the highest peak of the world. The other important high peaks are Kanchanjanga (8598 m.), Makalu (8481 m.) Dhaulagiri (8172 m.), Mansalu (8156 m.), Choe-Olju (8153 m.), Nangaparbat (8126 m.), Annapurana (8078 m.) Nanda Devi (7871 m.), Nancha Barwa (7756 m.) and Harmosh (7397 m.).

(e) Passes: It is very difficult and dangerous to cross this mountainous subdivision. But still many passes are found to go to Tibet at the height above 4500 metres. Main examples of such passes are Burzil and Zojila in Kashmir, Lanak La, Chang La, Khurnak La in Ladakh, Bata Khepcha La, Korika and Shipki La in Himachal Pradesh, Thag La, Niti, Lipu Lekh, Tatkala Kot in Uttar Pradesh and Nathula, Jelep La in Sikkim.

The trade between India and Tibet by road is only through two passes out of from the above mentioned passes. Shipki La joins Shimla and Gartok and Jeep la joins Kalimpong and Lhasa through the Indo-Tibet roads.

(f) Valleys: Being snow bound for most of the year the mountain ranges of the greater Himalayas are also known as the snowy ranges. Because of this perennial rivers have originated. Due to the deposition of the sediments brought by these rivers into lakes at the height of 1500 metres, large valleys have been formed. The valley of Kathmandu and valley of Kashmir are famous from this view point.

(III) The Lesser Himalayas

This third division of Himalayan region is also known as Himachal or Middle Himalaya. They were originated about 30 lakh years ago. Its average height is between 3500 and 5000 metres while average width is between 60 to 80 km The 'southern spurs' of the Great Himalayas join this region. On higher reaches, the snow falls in the winter season and pleasant weather conditions prevails in summers.

(a) Ranges: Pir Panjal and Nag Tibba in Kashmir, Dhauladhar in Himachal, Mahabharat in Nepal, Mussorie in Uttar Pradesh and Thimphu in Bhutan are the main mountain ranges of this mountainous division.

(b) Valleys: This region has long and recreational valleys, like Kashmir Valley, Kangra Valley, Kullu Valley, Bhagirati Valley and Mandakini Valleys.

(c) Health resorts and tourist centres: Many beautiful tourist and health centres like Shimla, Srinagar, Mussoorie, Nainital, Darjiling and Chakrata etc. are found in this region.

(IV) The Outer Himalayas

This mountainous region of Himalaya is also known as the Shiwaliks, Sub-Himalayas and southern Himalayas. These mountain ranges extend parallel in the south of lesser Himalayas from east to west direction. Their average height varies between 900 to 1200 metres and width is between 15 to 50 kilometres. This region was formed during the tertiary period. Long and deep sedimentary rocks are found in this region. These are formed by the deposition of clayey soil, sand stones, and slate etc. eroded by rivers from the Himalayas. Later on during the tertiary period these sedimentary rocks got converted into the folded mountains due the internal forces of the earth. These mountains blocked the passage of the south flowing rivers and formed lakes, which were filled with sediments and came to be known as 'doons'. In the east these are called 'Duars'. Most famous among these are Dehradun, Patlidun, Kothridun, Chaukhamba, Udhampur and Kotli.

(V) The Off-Shoots

The Himalayan mountain ranges at their eastern and western margins take the north –south direction. These hills found on the edges are known as eastern and western off-shoots respectively.

(a) The Eastern Off-Shoots: These off-shoots are also known as Purvanchal. These ranges start from Dihang gorge of Brahmaputra in Arunachal Pradesh, and gets divided into two parts after making the boundary between eastern India and Myanmar (Burma):

(i) Formed by Ganga-Brahmaputra, one off-shoot reaches the plains of Bangladesh, in which Dapha Bum, Patkai Bum, Garo, Khasi, Jaintia and Tripura hills are included.

(ii) The second off-shoot reaches the delta of Irawadi, starting from Patkai Bum to Naga hills, Brail, and Lusai.

Dapha Bum (4578 metres), Saramati (3926 metres) and Jpau are the main peaks in these eastern off-shoots of Himalayas.

(b) The Western Off-Shoots: From the Pamir Knot in the north-west, the Himalayan ranges gets divided into two sub-off-shoots. The first off-shoot reaches the Arabian Sea in the south-western direction running through the middle of Salt Range of Pakistan, Suleman and Kirthar. The second off-shoot joins the HinduKush of Afghanistan and Caucasus mountains.

(2) The Great Northern Plains

(i) Situation: These plains stretch from the Indus river in the west to the Brahmaputra river in the east. These plains of India stretches from the arid plains of Rajasthan to the humid areas of Assam. To the north of these great plains lie the southern slopes of Himalaya mountains, while to their south these are adjoined by the northern dissected parts of the Deccan plateau.

(ii) Size: Between the river Ravi and the delta of Ganga the total length of

these plains approximate 2400 kilometres and their width is between 100 to 300 kilometres. However, their width varies from 90 kilometres in the valley of Assam in the east, and 200 kilometres in Bihar upto 500 kilometres in the Rajasthan regions in west. Its height above the mean sea level is 180 metres or 600 feet. The depth of this plain is estimated between 5 to 32 kilometres and covers a total area of about 7.5 lakh sq. km

(iii) Formation: The deposition by three main river systems has contributed to the formation of these great plains. Sutlej in the west, Ganga in the middle and lower parts and Brahmaputra in east, along with their tributaries deposited huge amount of soils. This deep and elongated trough was formed between the Himalayas and the peninsular plateau during the Tertiary era with the internal compressional activities of the earth, in which water of the Tethys had been collected after the rise of Himalayas. Rivers originating from the Himalayas and the Gondwana land had regularly been depositing sediments for a long period and in present times also due to the deposition of 3 lakh tons of alluvium every year by the Ganga river in the Bay of Bengal, this plain is continuously increasing in its length.

(iv) Surface features:

(a) Levelled Plains: Whole of the north Indian plain is flat and levelled. The slope is so gentle that generally it is difficult to recognize.

(b) River Network: This entire plain region has a network of rivers and choes due to which Doab regions have been formed. The name of our Punjab state is also due to the flow of five rivers and due to the continuous deposition of alluvium by the waters of these five rivers. In Persian language Punj means five and aab means water. Hence the name 'Punjab' has been given to this area.

(c) Landforms: Because whole of the plain is formed by the deposition of alluvium by the rivers, that is why landforms like alluvial fans, alluvial cones, meandering river terraces, natural levees, flood plains are found in it.

(d) Sediments: The deposition of different layers of soils by deposition in these plains has uninterruptedly been going on from very long times. The sediments therefore include clay, sand loam and silt in larger amounts. The clay is found more near the mouths of rivers, whereas the sands are predominant in the upper reaches.

(e) Surface variations: Although these plains are flat but when seen closely, their relief varies in terms of deposition of sediments. Due to the continuous deposition of sediments over a long period of time, the formation of following alluvial plains has taken place.

(i) Khadar plains: Due to annual floods in the rivers of Uttar Pradesh, Bihar and West Bengal, there is deposition of newer alluvium. Such areas which are under the influence of floods, close to the rivers are known as the Khadar plains. These plain areas are known as 'Bet' in Punjab.

(ii) **Bangar plains:** Those uplands which remains almost free from the flood water and there is greater amount of lime-stone in the older alluvium are known as Bangar plains. In Punjab, Haryana and Uttar Pradesh these are called as Reh, Kallar or Dhaya.

(iii) **Bhabar plains:** When the rivers of North India after leaving the Shiwalik hill regions, enter the flat plains, then they deposit sand, pebbles, silt, stones and gravels etc brought down by them and give rise to plains which are known locally as Bhabar or Ghar. In such plain areas, the water of small streams generally flows below the surface of land rather than on the surface.

(iv) **Terai plains:** The water that sinks underground in the Bhabar plains, reappears on the surface, and this water converts large areas along the rivers into marshy lands. This humid and marshy land, running parallel to the Shiwalik hills in a long belt, has hot and humid conditions and hence there is abundance of dense forests and wild life. This region is known as the terai plain.

(v) **Bad lands:** In north peninsular plateau and foothills of western Shiwalik hills, due to gully erosion by the rivers, streams and rain, narrow valleys and ravines are formed. The land not fit for agriculture in such plain areas is known as the bad land. The fertility of land in these plains is almost negligible.

(f) **Division:** Besides the variations in deposition of alluvium, the macro level regional distribution of these plains is equally important. This east-west extending vast plain can be divided into following four macro regions:

- (i) The Punjab-Haryana plains
- (ii) The Thar desert plains
- (iii) The Ganga plains
- (iv) The Brahmaputra plains

(i) **The Punjab-Haryana plains:** These owe their origin to the aggradational work of the Sutlej, the Beas and the Ravi rivers. This uniform and flat plain is formed by the Indus and its five tributaries. Due to the creation of the international border between India and Pakistan in 1947, greater part of it went to Pakistan. To the other side, due to the rise of the surface near Delhi, the Yamuna had started flowing towards east. Delhi and its surrounding area work as a water-divide between the Ganga and the Indus river drainage systems. Its length in east and south-west direction from Pakistan border to the Yamuna river is 500 kilometres and is 640 km long from north-east to south-west. The height of the plains varies from 300 m in the north to 200 m in the south-east. The slope of this plain is towards south-west. The low and hard residential rocks of Delhi and Mahendergarh district separate it from the Ganga plains. The total area of this fertile plain is 1.75 lakh km². The interfluves formed on the basis of river boundaries can be divided into four sub-divisions:

- (a) Area between the Ravi and the Beas is known as Bari Doab or the Majha plain

- (b) Area between the Beas and the Satluj is called Bist Doab or the Doaba region
- (c) Plain area spreading from the Satluj to the Malwa plateau is termed as the Malwa plain, and
- (d) The flat area from the Ghaggar to the Yamuna is known as the plain of Haryana.

(ii) The Thar Desert Plains: The drier and flat area extending from the southern parts of Punjab and Haryana to the Rann of Kutch of Gujarat is known as the Thar-Desert. The Aravalli mountain ranges form its eastern boundary and the international boundary falls to its west. This tract is about 640 km long and 300 km wide and covers an area of 1,75,000 sq. km. It is also called the western plain. Its height above the mean sea level is between 120 to 150 metres. Most of this arid plain was under the sea from the permo-carboniferous period until it was uplifted during the Pleistocene. The existence of several land forms and features of river Sabarmati and Markanda indicate that the region was once fertile. At present seasonal streams like Bandi, Jajri, Sukri etc. and many salt lakes like Sambhar are found in this region. Due to the scarcity of rain, the whole of the region has become sand dunes. The sand dunes are 50 to 100 metres high in Barmer district. In the whole of this dry region, the action of wind is very fast. Westward along the Aravallis, there are found fertile plains (Rohi), important among which are the Gang Rohi and the Godawar Rohi.

(iii) The Ganga Plains:

(i) Situation: This plain is spread over the states of Uttar Pradesh, Bihar. Extending from Yamuna in the west, the international boundary of Bangladesh in the east, Shiwaliks in the north and the northern extension of the peninsular plateau in the south, this vast and fertile plain is important from the historical, agriculture and dense population point of view.

(ii) Rivers: The Ganga, the Yamuna, the Ghaghra, the Gandak, the Son, the Kosi, the Betwa and the Chambal rivers have deposited a 2000 metres deep sediments here.

(iii) Landform Names: The marshy belts formed in the northern Terai region of this plain are known as Cauis, whereas along the southern borders of this plain there are large Ravines which are called 'Jala' and 'Tal' or Bad lands. Beside these, the whole plain has long belts of deposits of older alluvium or Bangar and Newer deposits of Khadar alluvium which vary in height between 15 to 30 metres. These are known as 'Kols' here. The belts of sand dunes formed by the depositional action of the wind are found in the Doab region of the Ganga and the Yamuna. These are called the 'Bhur' in Muradabad and Bijnour districts of Uttar Pradesh.

(iv) Slope: The slope of entire Ganga plain is towards east. The plain covers an area of about 3.57 lakh km².

(v) **Division:** The Ganga plains can be divided into three sub-divisions on the basis of height:

(a) **The upper Ganga plain:** This is also called the Ganga-Yamuna Doab. The Yamuna river is to its west and the gently sloping areas with 100 m. height forms its eastern border. Ruhelkhand and Awadh plains are also its parts. Besides the Ganga-Yamuna rivers, the Ramganga, the Hinden, the Chambal, the Betwa, the Kali, and the Pandu etc rivers deposits have also contributed in the formation of these plains.

(b) **The middle Ganga plain:** This plain is also known as the Bihar plain or the Mithila plain. Its height is between 50 to 100 metres. It covers an area of 35000 km² from the Ghaghra river to the Kosi river. The rivers Ganga, Ghaghra, Gandak, Kosi, Son and Rohini etc. had deposited sediments in it. Due to the very gentle slope, landforms like oxbow-lakes, natural levees, and shifting meanders are found in large numbers.

(c) **The lower Ganga plain:** This plain area of Ganga, upto an height of 50 m. above mean sea level, is a flat deltaic region lying between the gap in the Rajmahal and the Garo hill ranges. It is located in the state of West Bengal and Bangladesh. Duars of the terai tract are found in its north and the world's largest Sunderbans Delta is located in its southern parts. This alluvial plain is formed by the deposition of sediment brought down by the Ganga and its tributaries (Bhagirathi and Hugli), Damodar, Suvarn Rekha and Tista.

(iv) **The Brahmaputra plains:** These plains are also called the Assam plains. This plain region extends from the western border of Assam to the extreme north-eastern part Sadiya of Assam. It is a narrow plain which is about 640 km long and 90 to 100 km wide. The Brahmaputra, Sesari, Dibang and the Lohit rivers have brought the alluvium (soil) from the Himalayas and surrounding hill ranges and has deposited here. Due to yearly floods this narrow plain is renewed by the deposition of newer sediments. The slope of this plain is from north-east to west.

(3) Peninsular Plateau Region:

(i) **Situation:** This plateau region stretches to the south of the Great Northern Plains and is a triangular ancient tabular block which has its apex in the south at Cape Comorin (Kanyakumari). It is formed essentially of the ancient Gondwana land hard and crystalline rocks. Its base areas are adjoined by the Indian Ocean towards south, the Bay of Bengal to the east and the Arabian sea towards west. Surrounded by sea from three sides, this triangular land block is also known as the Peninsula. On the basis of its situation, surrounded from all sides by the flat plains, this plateau region is also considered as a continental plateau.

(ii) **Size:** Extending from Aravallis in the north-west to the Shilong plateau in the north-east and Kanyakumari in the south, this triangular hard block of land occupies almost 50 per cent of the total land area of the country. Its total area is 16 lakh km² and the elevation varies from 600 to 900 metres.

(iii) Surface Formation:

(a) Origin: Entire peninsular plateau was born before the origin of the Himalayas during pre-cambrian era i.e., 50 crore years ago, with the silent flow of lava which had come to the southern part of India due to the internal movements of the earth almost 7 crore years ago during the tertiary period.

(b) Structure: This plateau is formed of ancient igneous rocks. In the high hills and the plateau region, the hard rocks like Gneisses, Quartz and marble are found. These hilly regions are found in residual form due to their erosion over millions of years. Besides this, due to the pressure from the Tibet plateau, it has experienced fracturing and faulting.

(iv) Division: The peninsular plateau region is not even. Rather there exist variations in height, slope and erosion in its surface. Therefore, on the basis of east-west extending Satpura ranges and the slope of the land, this peninsular region is broadly divided into two parts. Its northern part slopes towards north or north-east and the general slope of the southern part is towards south-east. The northern part is known as the Malwa plateau while the southern part is known as the Deccan plateau.

(i) The Malwa Plateau: Bounded by the Aravalli mountains in the west; Bundel Khand and Baghel in the north; Chota Nagpur, Rajmahal Hills to the Shilong plateau, in the east; and the Satpura hills in south, this triangular landmass is called the Malwa plateau. Its apex is at the Shillong plateau. The northern border of this plateau is concave in shape. This northern part of the Peninsular plateau slopes towards the north and rivers like Banas, Chambal, Ken and Betwa has converted it into deep and narrow valleys called ravines. The Chota Nagpur plateau is to the east of this plateau. Rich in natural minerals, this dissected lava plateau includes Hazaribagh, Gaya and Ranchi plateaus also. Its average height is 900 metres. Parasnath (1365 m.) and Netrahappat (1119 m.) are its highest peaks. Due to the deposition of 100 m. thick alluvium soil in the gap between its adjoining Rajmahal hills and the Shillong plateau, there has emerged a south-east sloping plain relief. This Malwa plateau has three major mountain ranges: (1) The Aravalli mountain range (2) The Vindhya mountain range (3) The Satpura hills.

(1) The Aravalli Mountain Range: Extending for about 725 kilometres from Delhi to Gujarat (Gir Hills) in the south west direction, these parallel ranges are residential hills, which has Guru Shikhar Peak (1722 metres) of Mount Abu as the highest peak.

(2) The Vindhya Mountain Range: Actually, on the southern slopes of the Vindhya mountain ranges, the escarpment boundary of the Malwa plateau is formed, under which the rift valley is formed and Narmada river flows in this valley towards the west. The western part of these mountain ranges is formed of lava. The eastern lava free parts are called the Kaimur and Bhaner ranges.

(3) The Satpura Hills: The Satpura hills are formed of the seven layers of lava. Running along the southern bank of Narmada river, with the Maikal and Mahadeo hills in the east, these reach the Chota Nagpur plateau of Jharkhand. Dhumgarh (1350 m.) and Amarkantaka (1127 m.) near Panchmarhi are among the highest peaks of these hills. The length of the Satpura ranges is 1120 km. Their western parts are known as the Rajpipla hills and eastern part as the Amarkantaka plateau. Rising from the eastern parts, the river Tapti also flows in the rift valley in westerly direction and enters the Arabian sea without forming a delta.

(ii) The Deccan Plateau: Falling between the Shatmala, Ajanta and Balaghat hills in the north; the western ghats in the west; the eastern ghat in the east; and the cardamom hills in the south, this huge plateau was formed due to the continuous flow of lava during the tertiary era (122 crore years ago). It covers an area of about 7 lakh sq. km and slopes from northwest to southeast. Its average elevation is from 300 to 900 metres. Seasonal streams had badly dissected its surface and has divided it into a number of clearly demarcated physical units: (1) Maharashtra table-land (2) Dandakaryana-Chhattisgarh region (3) Telangana plateau (4) Karnataka plateau (5) western ghats (6) eastern ghats, and (7) southern hill group.

1. The Maharashtra Table-Land: This plateau region is formed of the Basaltic lava rocks, which has been converted into a number of basins by the erosional activity of many rivers like Godavari, Bhima, Krishna, Vardha and Venganga. The north-western part is known as the Marathwara table land, where Godawari and Majhira basins are found. The Vardha and Venganga with the help of their basins had formed the Vidharbha region in its eastern part. The upper basins are formed by the Krishna, Bhema and Sind rivers in the south.

2. The Dandakaryana-Chhattisgarh Region: This region lies between the Bastar district of Chhattisgarh and Koraput district of Orissa. The upper valleys of Mahanadi and Venganga and Sivunath and Indravati river basins are found in it. This undulating, dissected and hard rock forested region is known as Dandakaryana. It has basaltic rocks of the Cuddapah age, alongwith limestone and shale. The Chhattisgarh plain formed by the Mahandi, covers an area of 7300 km² in this region.

3. The Telengana Plateau: The gently sloping area of the Karnataka plateau in Andhra Pradesh, which extends towards the east is known as the Telengana plateau. It is characterised by rounded hills, rolling plains, broad open river valleys and big rocky boulders. It is also called as the Andhra Pradesh plateau.

4. The Karnataka Plateau: Areas, situated in the middle parts of Deccan plateau, having an elevation of 600 m. above mean sea level are known as Karnataka plateau. Its height increases to 1100 m. towards the south whereas the high table land of 900 to 1100 m. is called as the Mysore plateau. The maximum height in this part of the deccan plateau is of Baba Budan Hills.

These have a width of 35-45 km. The hilly and dissected parts are known as Malnad while the rolling plain areas covered with granite layer are known as the Maidan. In the entire plateau, deep valleys had been formed due to the weathering and erosional work done by the Krishna, Tungabhadra, Pennar and Cauvery rivers.

5. The Western Ghat: The mountain range running continuously parallel to the coast for about 1600 km along the western border of the Deccan plateau, from that of the river Tapi to Cape Comorin (Kanyakumari) is known as the Western Ghat or the Sahyadris hills. Their average height is 1200 metres. The waterfalls gorges and steep slopes present a view of the landscape of youthful stage. In this long north-south range of mountains, there are three passes Thalghat, Bhorghat and Palghat. Jog or Gersoppa falls (250 m.) are formed on the west flowing Sharvati river. From Thalghat pass to southern hill group, Vavul Mala (2339 m.), Kudremukh (1894 m.), Pushpagiri (1714 m.), Kal Subai (1646 m.), Salher (1567 m.), Mahabaleshwar (1438 m.) and Harichandragarh (1424 m.) are among the highest peaks.

6. The Eastern Ghat: The semi-plateau areas of the Deccan plateau, which are about 800 km in length and are 500 metre high and run from the Mahanadi valley in the north to Niligiri hills in south are known as the eastern ghats. As compared to the western ghats, these are wider, dissected, parallel to the coast, and are landmasses of low and broken hills. The east flowing rivers divide these ghats into three parts – the northern, the middle and the southern.

- (i) The hill ranges of the northern division are found between Mahandri and Godavari rivers, with an average height of 900 m. In these the Mahendragiri (1500 m.) is the highest peak.
- (ii) The middle division is located between the Krishna and Pennar rivers in the Cuddapah and Kurnool districts. The Nallamalli, Palkonda and Velikonda hills are found in this part.
- (iii) In the southern division from Pennar river to the Niligiri hills, there are found Jawaddi, Gingee, Shivrai, Kollaimalai, Pachaimalai, Gondumalai, Beligir and Rangan hills.

7. The Southern Hill Group: The place where the hills from the northern parts of the Deccan plateau, join the hills of the western and the eastern ghats, in the extreme south, is known as the southern hill groups or the Niligiri hills. The Nilgiris or the Blue mountains have an average height is 1220 m. Due to the meeting of three mountain ranges coming from different directions on these hills, there is formed a 2695 m. high Anaimudi Knot. The mountain ranges like cardamom or Elami from the south; Anaimalai from the north; and Palni from northeast meet here. The highest peaks in this whole hill group are Doda Betta (2637 m.) and Makurti (2554 m.). Doda Betta, Ootacamund, Palni and Kodaikana (2195 m.) are the main hills stations.

(4) Coastal Plains

The Deccan plateau is surrounded on three sides by long low lying plains running along the coast from Kuchchh area of Gujarat through Kanyakumari to the Mahanadi delta. These narrow plains have been formed by the deposition work of the sea or rivers and the emergence or submergence of ocean coasts. The coastal plains formed at the eastern and western margins of the peninsular plateau are very different from each other. As compared to the eastern plains the western plains are less wide more humid, have larger number of narrow bays, beautiful lagoons, marshy areas and parallel reefs. Therefore, on the basis of their situation, the coastal plains can be divided into two parts: (i) The western coastal plains (ii) The eastern coastal plains.

(i) The Western Coastal Plain: The narrow and flat plains extending in the north to south direction, for about 1500 km in length and 30 to 80 km in width, between the Arabian sea and the western ghats is known as the western coastal plain. They slope towards the south and south-west. On the basis of surface characteristics these plains can be divided into four main parts. 1) The Gujarat coastal plain, 2) The Konkan coastal plain, 3) The Malabar coastal plain, and 4) The Kerala coastal plain.

(1) The Gujarat Coastal Plain: This coastal plain lies in the north of western coast. The deposition of sediments by the rivers like Sabarmati, Mahi, Luni, Banas, Narmada and Tapi has given rise to the formation of peninsular plains of Kuchchh and Kathiawad and elongated plain of Saurashtra. The Rann of Kuchchh is still marshy and below the sea level. Gir mountain ranges of lava are also found in the peninsular part of Kathiawar. The Giraknath (1117 m.) is the highest peak in the Girnar hills. This coastal plain of Gujarat is 400 km long, 200 km wide and 300 m. high. But after reaching Daman and Diu in Saurashtra, their width reduces to 80 km and height becomes only 150 m.

(2) The Konkan Coastal Plain: The plain stretching from Daman to Goa is known as the Konkan coast. The submergence of coastal parts is generally seen. That is why, this 500 km long plain strip reduces to the width of 50 to 80 km. Due to the impact of strong sea waves many narrow bays, gulfs, internal coves and beaches of sand etc landforms are found in this plain. The famous Mumbai island is situated in the creek of Thana. Besides these, two very small and steep sloping river valleys namely Vaitarna and Ulhas are also found in this coastal region.

(3) The Malabar Coastal Plain: Almost 225 km long and 24 km wide plain from Goa to Mangalore is also known as the plain of Malabar coast or the Karnataka coastal plain. It is narrow in the north and wide in the south. However, at many places it extends upto Kanyakumari (Cape Comorin). Submerged Estuaries of river Marmagoa, Mandau and Sheravati are found in this plain.

(4) The Kerala Coastal Plain: Nearly 500 km long, 10 km wide and 30 m

high plain areas extending from Mangalore to cape comorin (Kanyakumari) are known as the Kerala plain. It has a number of lakes (lagoons). The off-shore parallel reefs make the water of land to stand in the form of backwaters, which are locally named as Kayal. These are linked together to permit continuous navigation by country-crafts. The Ashtamudi and the Vembanad lakes are spread on a large area and are used for boating.

(ii) The Eastern Coastal Plain: These coastal plains have the Bay of Bengal to their east and the eastern ghats to their west. These extend from the delta of Subaranrekha river in the north to Kanyamumari in the south for about 2000 km. Their average width is 150 km and height 100 m. As compared to the western plains, these are more wide, higher, arid, are formed of deltaic alluvium and have big lagoons. On the basis of location, these plains are divided into two sub-divisions : a) the Northern coastal plain b) the southern coastal plain

(a) The northern coastal plain: The extent of these plains is near the 16° north latitude, from the mouth of Krishna river to the mouth of the Subaranrekha river. It is nearly 1100 km long and 120 km wide. This plain is also known as the Golconda, North Cricar and Kokunada plains. The deltaic plain of Mahanadi near the coast of Orissa is also known as the Orissa plain or the Utkal coastal plain.

Low and wider deltaic areas have been formed in this plain region by the deposition of soil brought from the Deccan plateau by the Subaranrekha, Brahmani, Mahanadi, Indravati, Godavari and Krishana rivers. Besides these deltaic regions, two big lakes are also found here. The Chilka lake is 70 km long, in which Bhargavi and Daya rivers fall. Between the Krishna and Godavari deltas is the second large lake namely the Kolleru lake.

(b) The southern coastal plains: These plains extending for about 900 km from the delta of Krishana river to Kanyakumari, are also called as the Coromandal Coast. These are much wider than the northern plains. At many places their width exceeds 150 km. The rivers like Krishna, Pannar, Cauvery and Viagia have brought the soil from southern hills groups and have formed vast, fertile deltas. Pulicat lake and Cauvery delta are the main surface features of this plain.

(5) The Indian Islands

Besides the main land, Indian Republic has its control over the islands in the sea also. India has almost a total of 250 islands. On the basis of their location, Indian islands are divided into two main sub-divisions – a) offshore b) on shore.

(a) The offshore islands: The total number of such islands is about 230. According to their sea location these are sub-divided into two groups. (1) The island group of Arabian sea (2) The island group of Bay of Bengal

(1) The island group of Arabian Sea: Formed with the deposition of coral reefs in south-eastern Arabian sea these islands are known as Lakshadweep

islands. They are 25 in number and the whole group has three major parts. The northern islands are named as Amindivi, the middle as Laccadive and the southern as Minicoy.

(2) The island group of Bay of Bengal: The 350 km long chain of these islands extends to the east of Bay of Bengal in north-south direction. Among these 200 islands, some islands are the raised parts of the peaks of submerged hill and some have been formed by the volcanic eruption of lava. These islands also have three main parts. 1) The Andaman island group 2) The Nicobar 3) The other adjoining islands.

The Andaman island group alone has 120 islands. To the south these, after Ten degree channel, 18 islands fall in the Nicobar island group. In this group, the Indira point of the Great Nicobar island contains the southern most point of the territory of entire India. Besides these, the islands like Narkondam, Barren, Ratland, Baratang are also found in this island group.

(b) The onshore islands: These include Sagar, Short, Wheeler and Newmoor etc. islands near the Ganga delta. Similarly, Bharra near Chilka lake; Pamban; Mandapus, Crocodile near southern coast of Tamil Nadu, Elephanta near Mumbai and Diu near the Gujarat coast etc are some of the big islands. The Bays of Khambat and Kuchchh too have many different sized islands.

Regional Continuity and Complimentarity

Although the country has been divided into different physical units for a comprehensive study but this doesn't mean that the above mentioned mountains, plains and plateau areas are different from each other and they have been demarcated by specific boundaries on the surface. Rather, these are all interrelated and inter-dependent. Their interdependence can be seen through their region and the availability of natural reserves.

(A) Origin:

- (i) Himalayan mountains have originated only as a result of the emergence of peninsular plateau.
- (ii) The great plains have been formed by the annual deposition of material brought down from the Himalayas and the peninsular plateau.
- (iii) The formation of hills, rift valleys and faults on the peninsular plateau has been due to pressure exerted by the Himalayan ranges.
- (iv) The formation of the coastal plains had been possible due to the deposition of material brought from the peninsular ghats.

(B) Natural Reserves:

(i) The Himalaya mountains, because of being covered with thick ice, are great reserves for the availability of water throughout the year. Their steep slopes provide ideal sites for the construction of dams for generation of

hydro-electricity. The adjoining fertile river valley plains have been formed only with the soils obtained from these mountains. The soft wood forests found on these mountain ranges are the main sources of fuelwood, various medicinal herbs and timber for furniture etc. These mountains have beautiful and winsome health resorts, rare wild life, hilly fruits, herbs and tourist places etc. which make them important. Besides these facts, in the north, the Himalayan mountains have always stood as a great wall and has not only helped in protecting the security and culture of the country from foreign invasions but they have also been protecting India from the cold blizzards generated by the continental winter high pressure system of north-eastern and central Asia. In this way life and agriculture in the plain and plateau areas of the country have been protected.

(ii) The great northern plain along the Himalayas provide support to nearly 40% population of the country. Their fertile soils, favourable climate and flat terrain has made a great contribution to extension of canals, roads, railways and cities and in the development of agriculture. Due to this, these plain areas have pride for being the food basket of the country and save the country from hunger and famines. These have created a special kind of culture and society since the Aryans to the recent times. The river Ganga is still the sacred for people all over the country and the places like Rishikesh, Haridwar, Mathura, Prayag, Ayodhya and Kashi etc. in its valley are the centre of attraction for Sufis and religious peoples living in different parts of the country. Later, in these plain areas only the Sikh Gurus, Mahatama Buddha, Mahavira Jain etc were born and different religions related with them prospered. The strong impact of these religions could be seen on Himalayas and on south India. Mughal Empires were so impressed by the towns and cities located in these plain areas that they established their capitals here and ruled the country.

(iii) The peninsular plateau is a great store house of almost all types of minerals. These include huge reserves of iron, coal, manganese, copper, mica, bauxite, etc. The modern industry of the country depends on these. The lava soils provide a base for cotton and laterite soils for tea, coffee and rubber and hence are making an important contribution to the development of agriculture and agro-based industries. The mixed deciduous species of forests like Teak & Sandal satisfy the demands of timber wood of the entire country. The water falls and dams located on both sides of the ghats of the plateau provide water for irrigation in the coastal plains and electricity for industrial development.

(iv) Country's coastal plains and islands are famous for the production and international trade of quality rice, arecanut, date-palm, coconut, spices, pepper, ginger, cloves and cardamom. Though these plains quality fish are supplied to all parts of the country. Harbours on the sea coasts of these plains connect the entire country with other countries. Sea Beaches of Goa, Mumbai, Tamil Nadu and Orissa attract tourists form all over the country.

Besides, salt used in our homes is also prepared in the western coastal plains. Thus, we find that different physical units of the land of the country are not independent and isolated units but with complete interdependence, these are contributing very strongly to strengthen the culture and economy of the country.

Exercise

I. Answer the following questions objectively :

1. Name main units of India's physical divisions?
2. What is the size of Himalayan mountain range?
3. Name the major peaks of Trans-Himalaya?
4. Which mountain peaks are found at the height above 8000 metres in Greater Himalayas?
5. Name the young and old mountains of India.
6. Where are rift valleys located in India?
7. What is meant by delta?
8. Name some important deltaic regions of India.
9. Which passes are found in Himalayan mountains.
10. Name the important mountain ranges of lesser Himalayan.
11. Which hill stations and valleys are found in lesser Himalayas?
12. Name the main doon valleys of our country.
13. Name the major eastern off shoots of Himalayas.
14. Which landform features formed by rivers found in the Great Northern plains?
15. What is the size of the Brahamaputra plain?
16. What is the extent of Aravalli Mountain range? Give the name of its highest peak.
17. Name the major peaks of the western ghats.
18. Name the Southern mountains of the Eastern ghats.
19. Which mountains ranges meets at the Anai Mudi Knot?
20. Which Hill Stations are found in Deccan plateau's hilly region?
21. What are the sub-divisions of North-Eastern coastal plains?
22. Name the Islands in Arabian Sea !
23. Which onshore Islands are found near the coasts of India?
24. Where is the Southern frontier-point located?

II. Answer the following questions in short :

1. Do we find any similarities between the Himalayan Mountains and the Daccan plateau?
2. Are the Himalayan Mountains still in their youth or young stage?
3. Throw some light on the surface features of the Great Himalayas.
4. Which alluvial plains have been formed in the Great Northern plains?
5. Write a geographical note on the Thar desert.
6. What could be the different divisions of Indian Islands on the basis of their location? Explain with examples and diagram.
7. What is the contribution of coastal plains to the entire country?
8. What is the contribution of Himalayan Regions to the development of the country as a whole.
9. How does the Peninsular plateau affect the other physical regions of India?
10. Differentiate between
 - (i) Terai and Bhabhar
 - (ii) Bangar and Khadar

III. Answer the following questions subjectively :

1. Divide the relief of India and explain in detail any one region.
2. Write a note on the origin and structure of Himalayas and are they still rising?
3. Compare the Western and Eastern coastal plains.
4. Give a detailed description of size, origin and regional division of India's Great Northern plains.
5. What is the extent and surface formation of Peninsular plateau? Describe its different sub-divisions on the basis of slope of the land.
6. Compare and contrast the surface features of the Himalayas and the Peninsular plateau.
7. Write short notes on:
 - (a) Vindhya
 - (b) Satpura
 - (c) Aravalli Mountains
 - (d) Malwa plateau
 - (e) Nilgiri Hills
8. "Are the different physical divisions of India Separate and Independent units or they are complementary to each other?" Explain this statement with examples.

IV. Show the following on the outline map of India:

1. Karakoram, Zaskar, Kailash, Pir Panjal and Shivalik hill ranges.
2. Coromandal, Konkan and Malabar coastal areas.

3. Passes of Thal Ghat, Bhor Ghat and Pal Ghat
4. Passes of Zojila, Nathula, Jelep La and Shipikila
5. Mount Abu, Darjeeling, Shimla, Kodaikanal, Jog falls and four tourist centers.
6. Mount Everest, Nanda Devi, Kanchanjunga, Mount K2 Godwin Austin, Peaks.

CHAPTER 3

THE CLIMATE

The word 'Climate' refers to the particular weather conditions prevailing at a place over a larger period of time i.e. the temperature, the water content present in the flowing air at a place etc. These weather conditions are largely determined by three important factors like variations, in relief, distance from the sea and distance from the equator and it very strongly affects man and his activities.

India is a vast country. Its major physiographic units, peninsular location and position of the Tropic of Cancer clearly affect its climate. Due to the wide variations in the surface features of country, its temperature, rainfall, storms, extent of winds and clouds, too vary greatly.

REGIONAL DIFFERENCES

- (i) With respect to temperature, during winters while, the temperature decreases to -45°C (below freezing point) at Daras near Kargil in the Greater Himalayas, it rises to above 20°C at Chennai (Madras) in Tamilnadu. Similarly, during summers, when it crosses the 50°C mark in Jaisalmer, located west side of the Aravalli mountains, it is recorded less than 20°C in Srinagar.
- (ii) With respect to rainfall village Mawsynram, located 16 Km west of Cheerapunji in Khasi hills, experiences an average rainfall of 1080 cm while only 12 cm of rainfall is recorded in western Thar desert. In other words, Mawsynram receives as much rainfall in one day as is received in eight years in the areas west of the Aravalli mountains.
- (iii) While people of Barmer and Jaisalmer in Rajasthan yearn for clouds, in Meghalaya the sky remains covered with clouds throughout the year.
- (iv) Similarly as moderate temperature prevails throughout the year in Mumbai and other coastal areas due to the nearness to the ocean, the interior areas like Delhi, Chandigarh and Ludhiana experience extreme and harsh type of climate. That is, winters are extremely cold and summers are extremely hot.

FACTORS DETERMINING THE CLIMATE

The Tropic of Cancer passes through the middle of the country, and it divides its climate into two different types. Those parts of the country which fall to the south of the Tropic of Cancer become closer to the equator. Therefore, they have high temperature with no winter season. But their climate should have been of tropical type. In areas north of the Tropic of Cancer, due to low temperature the winter and summer seasons are there, not the climate should have been of the sub-tropical type. But this is not so because the climate of the entire country is full of diversities which is affected by many other factors, besides the location of the country.

- (i) **Distance from the Equator:** India is located near the equator in the Northern Hemisphere. That is why, except the Himalayan mountain region, high temperature prevails throughout the year in almost all areas of the country. Therefore, it is also considered as a country of hot climate.
- (ii) **Relief:** The east-west extending high mountain range of Himalayas in the north, exerts a very strong influence on the climate of India. On the one hand, this mountain range protects India from the cold blizzards blowing from Central Asia, because of which the temperatures remain above freezing point during winters in the plain areas. On the other hand, because of being high, this range act as a barrier for the monsoon winds blowing from the Bay of Bengal and divert them to the north –western parts of the country and brings change in the extremely hot and dry climate of these parts. These winds bring heavy rainfall to the sea facing slopes of Western Ghats and hilly regions of Assam. But the Deccan plateau and the trans –Himalayan regions, being located on the leeward side come in the rain-shadow zone and remain dry. Similarly, the Aravalli mountain region also remains devoid of rainfall because of its location in north-south direction parallel to the direction of southwest monsoons. Therefore, the presence of the Himalayas, is the biggest factor in maintaining the monsoon type of climate in the country.
- (iii) **Air Pressure System:** With the onset of summer season, the sunrays start falling directly on the Tropic of Cancer in the Northern Hemisphere, as a result of which the temperature of northern parts of the country starts rising. With the increase in temperature, low pressure centres (994 mb) begins to form over the North Indian Great Plains, which are also called as the Inter Tropical Convergence Zone (ITCZ). During winters, these very plain areas get converted into high pressure zones, due to the extreme cold conditions while low pressure is created over the Indian Ocean.
- (iv) **Seasonal Winds:**
 - (a) Due to the change in the air pressure during summers and winters, seasonal winds blow in the country. Winds blowing from sea to land for six months during summers are hot and humid whereas winds blowing from land towards the sea during six months of winters are cold and dry. The different seasons in the country are based on these winds only.
 - (b) The direction of these seasonal or monsoon winds blowing over the earth's surface is also affected by the upper air circulation present at the height of 3 kms above the surface, which is also called the Jet Stream. During summers, these cold and high pressure fast winds crosses the Tibetan plateau behind the Himalayan mountain ranges and in winters are shifted to 25° C north latitude. Due to these winds, the cyclones of summers and western seasonal disturbances of Mediterranean regions reach northern parts of the country and bring heavy rainfall.

- (v) **Nearness to the Indian Ocean:** The adjoining great Indian Ocean has left a very strong imprint on the climate of the entire nation. Due to the even surface of the Indian Ocean, the south –western monsoon winds, coming from areas south of equator also blow with full speed towards India. These moisture-laden winds bring life in the life-style of the entire country by distributing the moisture absorbed from the sea. The Coromandel coast receives rainfall in winters only due to the location of Bay of Bengal and cyclones developed here also bring heavy rainfall during summers. The peninsular areas being surrounded from three sides by sea provide moderate climate to coastal areas where summers are less hot and winters less cold.

Therefore, the above mentioned factors clearly indicate that in India hot-tropical monsoon type climate is found, in which monsoon winds exert a strong impact on almost all parts of the country at different times.

INDIAN MONSOON SYSTEMS

The word ‘monsoon’ owes its origin to the Arabic word ‘Mausam’ which means change in elements (temperature, humidity, pressure and direction of local winds) due to the change in season. A surface wind that blows in a particular direction in one season but reverses completely in the other season is known as monsoon wind. The cycle of these monsoon winds is largely confined to the Tropical zone, that is, between 35°N and 20° S latitudes. This cycle of winds owes its origin to the differential heating of land and sea. Due to this change, the equatorial low pressure belt shifts towards the Tropic of Cancer in summers. This belt is known as the ‘Inter Tropical Convergence Zone - ITCZ’. To fill this low pressure, south-east trade winds from the southern Indian ocean are deflected to the right by earth’s rotation on crossing the equator and as a consequence a large part of the air acquires an anti-cyclonic (clockwise) circulation from south-west to north-east direction. These winds after travelling a long distance reach the west coast of India on first of June and brings heavy rainfall which is known as the ‘monsoon burst’. When the winds from around the Kerala coast cross the west coast, then also moderate rainfall even before first June, which is known as the ‘pre-monsoonal rainfall’. These monsoon winds provide rainfall to the entire country after June to mid-September. Heavy rainfall received by Tamilnadu in winters is brought by the retreating monsoon winds.

Besides, the above mentioned theory of temperature differential, the upper air circulation is also considered as the reason for the origin of these winds, because of which the arrival of these monsoon winds in the north-western parts of the country is attributed to the ‘Jet’ stream present at heights in Northern India. With its movement only, these winds bring rainfall to northwestern regions. Third and modern reason is the El-Nino current flowing near the coast of Chile in the Pacific ocean. However, its scientific analysis is yet not available.

CHARACTERISTICS OF MONSOONAL RAINFALL

The amount of average annual rainfall of the country is about 118 centimeters, which is mostly brought by the monsoon winds. This monsoonal rainfall has many characteristics in the country:

- (i) **Rainy Season and Quantity:** India receives most of its rainfall (87%) during summer, from March to September by monsoon winds. The remaining 13% of the rainfall is received after the monsoon season from September to October, 3% of which is received in the month of January and February and 10% in the month of March to May before the onset of monsoon. Nearly 74% of the rainfall in the country is received in the rainy season from June to Mid-September.
- (ii) **Variability:** The monsoonal rainfall received in India is not reliable. Sometimes it is excessive and sometimes it does not occur at all. And this variability of rainfall often results in the famine and starvation conditions. This variability goes on increasing towards the state of Rajasthan and interior areas of the country.
- (iii) **Uneven Distribution:** The distribution of rainfall in the country is uneven. The average annual rainfall varies from 250 cms. in hills of Meghalaya, and Assam and western slopes of western Ghats to less than 25 cms. in Western Rajasthan, Western Gujarat and North Kashmir.
- (iv) **Uncertainty:** The quantity of monsoonal rainfall received in India is uncertain. Sometimes, monsoon winds arrive in an area before its normal time and create a flood-like situation in many areas because of heavy rainfall. And sometimes it is insufficient or ends before its normal times which causes drought and damage to crops. Also the water which is stored for irrigation throughout the year is supplied to the canals in highly restricted amount.
- (v) **Dry Spells:** During summers, many a times monsoonal rainfall is not regular and it occurs occasionally after an interval of few days or weeks. As a result rain cycle breaks and a long and dry spell occurs in the rainy season. This dry period is known as the monsoonal break, which develops as a consequence of tropical cyclones developed in the Bay of Bengal or the Arabian Sea.
- (vi) **Orographic rainfall:** Monsoonal rainfall actually is originated due to the cooling of moist winds by rising at heights along the mountains and plain areas. Due to this, southern or windward sides of mountains receive heavy rainfall and northern and leeward sides being in the rain-shadow area remain dry.
- (vii) **Torrential rainfall:** Monsoonal rainfall often occurs in large quantity and for days together. Therefore, there is a proverb that '*it never rains in India but it pours*'.

DISTRIBUTION OF ANNUAL RAINFALL IN INDIA

A wide range of regional variations is found in the annual distribution of rainfall in India, which have a deep impact on the climate and agriculture of the country. Orographic rainfall occurs in southern slopes of the Himalayas and in western slopes of western Ghats. Southern parts of the country receive convectional rainfall and northwestern regions receive cyclonic rainfall. The entire country receives mostly orographic rainfall and every month there is rainfall in one part of the country or another. The main reason for the uneven distribution of rainfall in the country is the relationship between distance from sea and location of mountains.

The average annual rainfall in India is 118cm. The hills of Meghalaya receive the maximum rainfall which is, more than 1000 cm, whereas Thar desert receives less than 20 cm of rainfall in one year. On the basis of annual amount of rainfall, the country may be divided into five major areas :

- (a) Areas of Heavy rainfall (Above 200cm)
- (b) Areas of High rainfall (from 150 to 200cm)
- (c) Areas of Moderate rainfall (From 100 to 150cm)
- (d) Areas of Low rainfall (from 50 to 100cm)
- (e) Areas of very Low or Scanty rainfall (Below 50cm)

(a) Areas of Heavy Rainfall: These areas exist in narrow belts in which annual rainfall is more than 200cm.

- (i) In the long and narrow coastal belt from Dadra and Nagar Haveli to Trivandrum, the south –western monsoon winds coming from Arabian sea to the western slopes of western Ghats bring heavy rainfall. Konkan and Malabar coasts receive continuous rainfall (May to October) for five months.
- (ii) The second area of heavy rainfall lies in the north-eastern part of the country. It includes Darjeeling, Bengal Duars, middle and lower valleys of Assam, southern Arunachal Pradesh and mountainous areas of Meghalaya. The Shillong plateau and slopes facing Bangladesh receive heavy rainfall. Here, Cherrapunji gets 1087 cm and its nearby located Mawsynram receives 1141 cm rainfall. These places are the rainiest in the world. Arunachal Pradesh receives more than 250 cm of rainfall for six months from April to the month of September.
- (iii) Besides these, the islands of Andaman & Nicobar and Lakshadweep also fall under the category of areas of heavy rainfall.

(b) Areas of high rainfall: There are three different regions in the entire country, where rainfall is heavy and is between 150 – 200 cm. These are:

- (i) A very narrow belt of 20 km. width along the western Ghats in the north-south direction which extends from the mouth of river Tapi to the plains of Kerala.

- (ii) Second belt of heavy rainfall runs along the southern slopes of Himalayas, from Himachal Pradesh through Kumaon Himalayas and reaches the lower valley of Assam.
- (iii) Third belt extends in north-south direction, which includes Tripura, Manipur and Mikir hills. They receive almost 200 cm. of rainfall. Table 3.1 shows the temperature and precipitation of some important stations in India. Read it carefully and note the uneven nature of rainfall and range of temperature.

(c) Areas of Moderate Rainfall : These areas receive the less reliable annual rainfall between 100 to 150cm. Three large areas of moderate rainfall are found in India :

- (i) The largest area extends in a long narrow belt along Orissa, northern Andhra Pradesh, Madhya Pradesh, Bihar, Eastern Uttar Pradesh and Shivalik Hills, upto the hills of Jammu which is delineated by the 100cm isohyte. The hilly relief of Chota Nagpur plateau receives rainfall by the two branches of monsoon winds and cyclones of Bay of Bengal.
- (ii) The second belt of moderate rainfall is stretched for 80 km. width on the eastern coast extending from Nellore (Andhra Pradesh) to the Southern Calimere point, which is also called the Coromandal Coast. However, this coastal area receive rainfall in both the seasons(winter and summer) but retreating monsoon gives more rainfall in winters.
- (iii) The expanse of third elongated belt is from the mouth of Narmada river on the eastern slopes of Western Ghats to Kanyakumari. Here southwestern monsoon winds give rainfall while blowing down the slopes.

(d) Areas of Low Rainfall: In this category, semi-arid areas, which receive an average rainfall of 50 to 100 cm. are included. This area extends along the frontiers of India with Jammu in the north to Kanyakumari in the extreme south. It includes western Madhya Pradesh, western Uttar Pradesh, Punjab, Haryana, eastern Rajasthan, eastern Gujarat, interior Maharashtra, Tamil Nadu, Karnataka and southern Andhra Pradesh. Generally these are all rainshadow areas lying in the Western parts of the states. Monsoon winds either become dry till they reach here or due to surface configuration, they can't reach the right heights and straightaway pass along these areas.

(e) Areas of Scanty Rainfall: These dry areas receive less than 50 cm. of annual rainfall. These include the territory behind the Zaskar mountain range from Ladakh to Karakoram; areas of Kuchchh and Western Rajasthan, and southwestern areas of Punjab and Haryana. Besides these areas, about 100 km. wide belt falling in the Deccan plateau in north-south direction also receives scanty rainfall. This area extends from Satpura hills and runs along the eastern slopes of western Ghats through the central districts of Karnataka and reaches the Kurnool district

Table 3.1 : Temperature and Rainfall statistics stations are in India

(Average - Monthly Temperature in Degree celcius, Average rainfall in centimetres)

Station	Latitude	Height (In m.)	January	February	March	April	May	June	July	August	September	October	November	December	Annual Aver.
Bangalore	12°58'N	909	20.5	22.7	25.2	27.1	26.7	24.2	23.0	23.0	23.1	22.9	18.9	20.2	20.2
	CM		0.7	0.9	1.1	4.5	10.7	7.1	11.1	13.7	16.4	15.3	6.1	1.3	88.9
Mumbai	19° N	11	24.4	24.4	26.7	28.3	30.0	28.9	27.2	27.2	27.2	27.8	27.2	15.0	
	CM		0.2	0.2	-	-	1.8	50.6	61.0	36.9	26.9	4.8	1.0	-	183.4
Kolkata	22°34' N	6	19.6	22.0	27.1	30.1	30.4	29.9	28.9	28.8	28.9	27.6	23.4	19.7	
	CM		1.2	2.8	3.4	5.1	13.4	29.0	31.1	33.4	25.3	12.7	2.7	0.4	162.5
Delhi	29° N	219	14.4	16.7	23.3	30.0	33.3	33.3	30.0	29.4	28.9	25.6	19.4	15.6	
	CM		2.5	1.5	1.3	1.0	1.8	7.4	19.3	17.8	11.9	1.3	0.2	1.0	67.0
Jodhpur	26°18' N	244	16.8	19.2	26.6	29.8	33.3	33.9	31.3	29.0	29.1	27.0	20.1	14.9	
	CM		0.5	0.6	0.3	0.3	1.0	3.1	10.8	13.1	5.7	0.8	0.2	0.2	36.6
Chennai	13°9' N	7	24.5	25.7	27.7	30.4	33.0	32.5	31.0	30.2	29.8	28.0	25.9	24.7	
	CM		4.6	1.3	1.3	1.8	3.8	4.5	8.7	11.3	11.9	30.6	35.0	13.9	128.6
Nagpur	21°9' N	312	21.5	23.9	28.3	32.7	35.5	32.0	27.7	27.3	27.9	26.7	23.1	20.7	
	CM		1.1	2.3	1.7	1.6	2.1	22.2	37.6	28.6	18.5	5.5	2.0	1.0	124.2
Shillong	24°34' N	1461	9.8	11.3	15.9	18.5	19.2	20.5	21.1	20.9	20.0	17.2	13.3	10.4	
	CM		1.4	2.9	5.6	14.6	29.5	47.6	35.9	34.2	30.2	18.8	3.8	0.6	225.3
Thiruvananthapuram	8°29' N	6	26.7	27.3	28.3	28.7	28.6	26.6	26.2	26.2	26.5	26.7	26.6	26.5	
	CM		2.3	2.1	3.7	10.6	20.8	35.6	22.3	14.6	13.8	27.3	20.6	7.5	181.2
Leh	34° N	3506	-8.5	-7.2	-0.6	6.1	10.0	14.4	17.2	16.1	12.2	6.1	0.0	-5.6	
	CM		1.0	0.8	0.8	0.5	0.5	0.5	1.3	1.3	0.8	0.5	-	0.5	8.5

of Andhra Pradesh. These are all totally rain shadow areas except Rajasthan. In Rajasthan region, hot and dry winds moving from Baluchistan (Pakistan) obstruct the path of Monsoon winds of Arabian sea due to which there is no rain in this area. The Monsoon winds of Bay of Bengal Branch shower most of the rainfall in eastern parts of the country and they are almost dry when they reach this area.

Thus, we may conclude that the annual distribution of rainfall in the country has three main features:

- (i) The amount of rainfall gradually decreases from Bengal towards the west and the northwest.
- (ii) In case of peninsular plateau also, the amount of rainfall decreases as one moves from western and eastern ghats towards the interior parts.
- (iii) The windward side slopes receive higher rainfall.

CYCLE OF SEASONS

Cycle of seasons is formed due to change in the direction of monsoon winds from time to time. The Indian Meteorological Department has divided the climate of the country into following four distinct seasons; on the basis of change in winds:

- (i) The cold weather season (from mid-December to February);
- (ii) The hot weather season (from March to mid-June);
- (iii) The wet rainy season (from mid-June to mid-September);
- (iv) The season of retreating Monsoon winds (from mid-September to mid-December).

(i) The Cold Weather Season: According to Indian traditional system of seasons, *Hemanta* and *Shishira* combine to form the winter season.

(a) Temperature: In the winter season sunrays fall straight on the Tropic of Capricorn in the Southern Hemisphere. That is, why the temperature goes on decreasing from southern to northern parts of the country. The 20°C isotherm runs parallel to the 20° north latitude in east-west direction through the middle of India. Places like Mumbai and Chennai have an average temperature of upto 25°C whereas it decreases to 10°C in the great plain of north India. Whole of the entire Ganga valley experiences a severe cold season. In places like Amritsar, Jalandhar and Delhi, some times the temperature falls below the freezing point, due to the cold wave. Because of tropical location, the southern parts of the country do not experience the winter season.

(b) Pressure: With the fall in temperature, the entire northern India is converted into a high pressure area. This area comes under the sub-tropical high pressure belt with the shift in the position of Sun towards the south. This belt of high pressure, extending from the Mediterranean sea through Western Asia, Persian Gulf, Iran and Pakistan, crosses the great plains of

India and reaches the China sea. A condition of anti-cyclone is formed by the isobar of 1020 mb. in Pakistan near Peshawar and in the northwestern parts of India. Sometimes, state of Madhya Pradesh, Jharkhand and Bihar also come under its influence. In southern and adjoining coastal parts of the country, isobars of low pressure of upto 1013 millibars are found.

Sometimes, the high pressure conditions in the northern parts of the country experience changes especially when many depressions (low pressure centres) enter the interior part of the country from western and northwestern parts. These are also called as the western disturbances or cyclones.

- (c) **Winds:** At the same time, high pressure areas develop over central and western Asia. Dry and cold continental winds from these areas enter the country through northwestern parts which cause a fall of many degrees in the temperature of the great plains. These northwestern cold winds, moving at a speed of 3 to 5 km. per hour are termed as the Cold Waves. On reaching the delta region of Ganga, these winds take a southerly turn towards the Bay of Bengal.

Winds blowing with a very high speed at a height of above 3 km. from the surface in the upper atmosphere, are called the 'Jet Stream'. These winds starting from the Mediterranean Ocean blow under the influence of westerlies towards the Tibetan Plateau in east direction. The Jet Stream gets divided into two branches – the northern and the southern, due to coming to high Himalayas in its way. The northern Jet streams moves north of Tibet, from west to east and the southern Jet Stream moves to the south of Himalayas till 25° north latitude. It is this southern Jet Stream, which affects the climate of the country to a very large extent. Because of this stream only about 5 cyclones enter India every month during winters, from the low pressure source region near Mediterranean ocean, after crossing Persian Gulf, Iran and Pakistan. With their arrival temperature increases and winds calm down. But after their departure western and northwestern cold winds again set themselves in motion.

- (d) **Rainfall:** During winter season, the rainfall occurs in interior places in the country. In northwestern parts, areas falling over Punjab, Haryana, northern Rajasthan, Jammu and Kashmir and Western Uttar Pradesh receives an average of 20 to 50 cm of cyclonic rainfall, which is very useful for the rabi crops. Whereas neighbouring Himachal Pradesh, Kashmir and Kumaon Hills experience snowfall. On the other hand, coastal areas of Tamilnadu and Kerala receive more rainfall in winters as compared to summers by the north-eastern monsoons.
- (e) **Weather:** Weather is pleasant in winters. Days are mainly warm (moderate) and nights are cold. Due to sharp fall in night temperature, sometimes dense or heavy fog appears. Also due to the cold waves in the plains, a sever frost occurs.

(ii) The Hot Weather Season:

(a) **Temperature:** Three and a half month long summer weather season is the longest season in India. After March, when direct rays of the sun start after crossing the equator, shifting towards the Northern Hemisphere, the temperature in the interior parts of the country start rising. The maximum daily temperature exceeds 38° C in Nagpur in the month of March, 40°C in Madhya Pradesh in April and 45°C in the month of May - June in the north -western parts. Minimum temperature at night remains between 21° to 27°C. The average temperature in the southern parts remains comparatively low (25° C) due to the nearness to the ocean.

(b) **Air Pressure:** With increase in temperature, areas of low pressure start shifting towards the northern parts. Equatorial low pressure belt extends parallel to the Himalayas in the north till Chota Nagpur Plateau and along the 25° N latitude in the south. This is also known as the Inter Tropical Convergence Zone and it attracts the monsoon winds from south to north.

In the month of May and June due to high temperature a low pressure Thermal Depression develops in the north -western parts of the country. And the southern 'Jet' stream shifts towards north of Himalayas. That is why, due to temperature inversion, a dynamic low pressure cycle develops in the air above the surface. In this way, a special situation develops in the north-west, in which till the height of 6-7 Km from the surface of the land, the low pressure cycles join each other and attract the monsoon winds fastly towards themselves.

(c) **Winds:** Due to the establishment of vast areas of low pressure in the country the local winds start blowing at different places. Hot and dry western winds move in the north -western parts during daytime, which become weak at night. Due to this, sometimes strong thunderstorms and in the afternoon, dust storms come. These cause heavy loss of life and property. After crossing the dry and hot desert areas, these western winds or westerlies become extremely hot, and are locally named as 'loo'. Many people die due to the effect of this 'loo'. Because of its continuous blowing, the north -Indian plains, become very hot and the intensity of low pressure increases further.

When hot and dry *loo* coming from the northwestern parts comes in contact with hot and humid winds from Bay of Bengal near Chota Nagpur plateau, it gives rise to stormy cyclones, which are again pushed to the northwestern parts by the strong southwestern monsoon winds. These tornado like cyclones are known as Norwester or Kalbaisakhis in West Bengal.

Even without the above mentioned surface wind cycles, changes do occur in summers in the upper atmosphere. The southern 'Jet' stream of the winters shifts towards the north and starts flowing in the northeastern direction in the north of the Tibet Plateau. To fill the vacuum of equatorial

low pressure in the south of Himalayas, the easterly Jet stream takes its place along the southern parts of the Tibetan plateau. It keeps on pushing the tropical cyclones towards western parts of India. In this way, due to the release of temperature during summers, the Tibetan highland turns into a radiation window around which Jet streams start moving in the clockwise direction.

- (d) **Rainfall:** Although this hot season is extremely dry but still some rainfall occurs due to the cyclonic cycle which provides some relief to the people from the scorching heat. Torrential rainfall which occurs in West Bengal is known as the Spring season rainfall. In regions such as Kerala and south Karnataka in south India, pre-monsoonal rainfall of bigger droplets occurs due to the blowing in of the sea breezes. This is locally known as the 'mango-shower' or 'Blossoms showers or Cherry showers'. Weather remains almost dry in rest of the country. Under local tradition, this season is considered to be the convergence of the summer and the spring season.

(iii) The Wet Rainy Season:

This season is also known as southwestern monsoon season. It extends from June to Mid-September in the country. At this time, the Inter-tropical convergence zone formed over northern great plains is able to attract the southeastern trade winds from the Indian Ocean beyond equator. These moisture laden moist eastern winds, after crossing the equator, change their direction due to the earth's rotation and start flowing from southwest to northeast at a speed of 30 km per hour. And on reaching the Kerala coast on 1st June, they suddenly bring heavy rainfall which is known as the 'burst of monsoon'. Due to their high speed only, these winds spread over the entire country within a period of one month.

These winds are divided into two branches by the peninsular plateau of the country. The first and the Arabian Sea branch moves towards the north along the western coast. Full of moisture, when this branch tries to cross the 2000 metres. high western Ghats, it gets cooled due to the 'lapse rate' and starts raining. The amount of rainfall goes on decreasing as the moisture decreases while moving north of the Arabian Sea. For example, Mangalore receives 330 cm. of rainfall, Mumbai 100 cm., whereas Bhuj receives only 30 cm. of rainfall. One sub-branch of this main branch moves through the valleys of Narmada and Tapti and reaches the Chota Nagpur Plateau and joins the Monsoon winds coming from the Bay of Bengal and gives more than 150 cm. of rainfall. Second branch of the monsoon winds of the Arabian sea moves towards the north, through Gujarat and Sind delta. By this time, firstly, the moisture content is largely decreased and therefore the Thar desert of Rajasthan remains dry. Secondly, due to the creation of a situation of temperature inversion by the sandy soil of the desert region, these winds are unable to enter this area. Thirdly, Aravalli mountains with lower altitude are also parallel to these winds and these just move straight without rising high, along these mountains. These moving winds on reaching

Punjab and Himachal Pradesh join the Bay of Bengal monsoon branch and as a result bring heavy rainfall near Dharamsala.

The second major and important branch of monsoon winds is known as the Bay of Bengal Branch. This branch moving from the eastern and western parts of Sri Lanka joins with the monsoon winds coming from above the Kerala hills and takes northerly direction. The monsoon winds coming down from the hills of Kerala cross the rainshadow areas of Tamil Nadu without any rain and again absorb moisture while moving over the Bay of Bengal. Moving over the Ganga Delta, the hills of Meghalaya come in their way. These saturated winds while crossing the 1500 m. high Meghalaya hills brings heavy rainfall. During this season, about 700 cm. of rainfall is received at Chirapunji and this is 60 per cent of the total rainfall received here.

After crossing Meghalaya hills, these winds fastly take northerly direction where high Himalayas come in their way. The Himalayas also divide them into sub branches, parallel to themselves by deflecting them into two directions of east and west. The eastern branch moves upward from the Brahmaputra valley to Arunachal Pradesh and provides heavy rainfall. The amount of rainfall decreases from Darjeeling (315 cm.) to Guwahati (110 cm.).

The second sub branch takes a turn towards west and through the great northern plain and gradually rising reaches the border areas of Punjab and Jammu & Kashmir. Here in this vast region these winds give 100 to 200 cm. of rainfall. The amount of rainfall also goes on decreasing with increase in distance from sea. The amount of rainfall at Kolkata is 120 cm., Patna 105 cm., Allahabad 76 cm., Delhi 56 cm., and Ludhiana 40 cm. and Amritsar receives only 25 cm. of rainfall. South of Shiwalik hills, with increase in the distance and temperature of these winds in southern parts of Punjab and Haryana, the amount of rainfall declines to only 10 to 20 cm.

During this season, although the Terai and southern slopes of hilly areas receive higher rainfall but declining trend in the amount of rainfall received is seen in these hilly areas too. For example, Nainital gets 200 cm., Shimla 130 cm. and Srinagar receives only 60 cm. of rainfall. Even if these winds continuously flow from the east and go on raining, but sometimes a dry spell or break of 3 to 4 days also occurs in between. The origin of these obstructions in rainfall is attributed to the pushing off tropical depressions of the areas around the Bay of Bengal, in the way of southwestern winds by the north trade winds. Higher number of these tropical depressions symbolises heavy rainfall. This rainy season comes to an end in the beginning of September with the fall in temperature.

(iv) The Season of Retreating Monsoons:

This season is also known as the '*Sharada Ritu*' according to the traditional system of seasons in our country. In this season, the vertical of the sun, after gradually shifting from areas south of Tropic of Cancer start moving towards the equator. Therefore due to decline in the solar radiation and due to heavy rainfall, the temperature in the northern areas falls greatly as a result of which

mights start becoming cooler. The sky is clear during daytime, and temperature increases slightly to 25°C. The amount of moisture left in the air by the recently ended rainy season is increased and such a condition is also called as the 'humus'.

In this season, the low pressure centres leave the northwestern parts and move towards Bay of Bengal to reach the Indian Ocean. These cyclones bring heavy rainfall in the eastern coastal areas and in the interior parts of Tamil Nadu.

These monsoon winds retreat in almost the same sequence as they arrive in the country. They firstly leave Punjab till 15th September, Uttar Pradesh till 1st October, Ganges Delta till 15th October and till 15th November these leave southern parts of Karnataka and Andhra Pradesh. So, in the great north Indian plains, due to the increase in dry climate, this season is also known as the autumn season.

INDIAN LIFE AND MONSOONS

The climate of an area or region has a deep impact on its economic, religious and social development. The Economic progress of that region can be seen through the development of its agriculture, industry and mineral wealth. In India life is primarily dependent on agriculture. Monsoon rainfall has an important contribution in providing a strong basis for its development. Monsoon is considered as that pivotal point of the country, on which is based the entire economic structure besides agriculture. When monsoon rains are timely and in adequate amount, agricultural production in the country increases and greenery is seen all around. But their failure leads to the drying of crops. Drought conditions prevail in the country and there is shortage of foodgrains in the stocks. Similarly, if these monsoons arrive early then floods are caused. Due to their late onset however, the crops cannot be sown in time and as a result production decreases. In this way a very strong relationship is developed between the development of agriculture and monsoonal rainfall in the country, as only one third of the country's land is still without water due to the non availability of proper irrigation facilities. Not only in dry regions but the people living in areas of developed irrigation, also feel great relief at the arrival of monsoon rains with which the falling level of underground water rises. In this way the economy of the country depends on the agriculture and in turn agriculture is totally dependent on the monsoonal rains. That is why the Indian Budget is largely called as the 'Gamble of Monsoons'.

Besides agriculture, the development of industry, minerals, telecommunication systems and administrative structure is based on the availability of large amount of energy. In this, the hydel power is the most commonly used source of energy. In case of failure of monsoons, the shortage of water occurs in water reservoirs. As a result, the regular supply of water for irrigation and the generation of hydel power is reduced. This leads to the decline both in production and in human efficiency. Also due to power cuts in industries the use of mineral resources decreases and the wages of mine workers also get reduced. Therefore, the economic structure of the entire country gets badly shattered.

Besides economic life, the religious as well as the social life are also affected. Monsoonal climate makes the people fortunate. People perform *yajnas* and sing folk songs while waiting for the onset of monsoons, like *kajri* in Bhojpur, *Malhar* in Braj, *sawan* of Haryana and *Teejan* of *sawan* in Punjab etc.

Thus, monsoon winds make a valuable contribution towards having a similar kind of thinking and life style within the country. Due to this, in every sphere, whether it is arid sandy land or it is a developed irrigated area, or a humid area, each gets affected. As a result of the change in these winds according to seasons, the rainfall occurring due to the sea winds and western cyclones becomes a part of the huge monsoonal structure. It is only because of the high Himalayan mountain ranges that the effect of monsoon winds has been possible in the country, over a vast area from the Tropic of Cancer to the Kashmir in northern parts.

Exercise

I. Answer the following questions in brief :

1. Name the factors affecting the climate of India.
2. Name the places in India having maximum and minimum temperature during winter season.
3. Give the names of hottest and coldest places in India during various seasons.
4. Name the driest and wettest regions of the country.
5. Name two places in India having moderate and extreme climate.
6. What is Jet Stream?
7. What do you mean by the term 'Monsoon'?
8. What is 'Burst of Monsoons'?
9. What do you mean by "Loo"?
10. What is 'Break of Monsoons'?
11. Where does EL NINO Ocean current flow?
12. What is 'kalbaishakhi' or Norwester ?
13. What is meant by 'Mango Shower' ?
14. At which places do the Monsoon winds coming from Arabian Sea and Bay of Bengal meet ?

II. Give reasons of the following in brief :

1. Mumbai is colder than Nagpur.
2. Most of the average Annual rainfall in India comes in just four months of the year.
3. Kolkata receives 145cm of rainfall where as Jaisalmer receives only 12cm of rainfall by the South-West monsoon.
4. Chennai receives more rainfall during winter season.
5. North-Western India receives rainfall in winter season.

III. Answer the following questions in short :-

1. What are the regional variations in the climate of India ?
2. Give an account of the main reasons for the climate variations in the country.
3. Why does the Pre-Monsoonal rainfall occurs ?
4. Describe India's rainy season.
5. Which places receive maximum rainfall in India ?
6. Give any three characteristics of Indian monsoon.
7. In spite of being close to the Arabian Sea, why does Rajasthan remain dry?
8. How do South-East trade winds monsoon rainfall?

IV. Answer the following questions subjectively :

1. Which elements affect the climate of India?
2. Describe the main characteristics of monsoon rainfall in India.
3. Explain the characteristics of different seasons of India.
4. Compare the summer and winter seasons of India.
5. Explain with the help of examples, the impact of monsoon winds on life in India.
6. In spite of vast monsoon unity, there exist wide regional disparities in India, Explain with examples.

V. Represent the following on the outline map of India:

1. Low pressure area in summer and direction of winds.
2. Areas of winter rainfall and direction of North-East monsoon winds.
3. Cherrapunji, Jaisalmer, Allahabad, Chennai.
4. Regions of very less rainfall.
5. Regions of more than 200 centimetres rainfall.

CHAPTER 4

NATURAL VEGETATION, WILD LIFE AND SOILS

In earlier chapters, we have studied in detail about the variations in relief and climate, present in our country. Both these elements directly influence the natural vegetation of the country. Besides these elements, natural vegetation also depends on the type of soil and depth of the underground water found in different regions. Climate, among these, is the most important influencing element. The types of natural vegetation, their development and geographical distribution are clearly influenced by the difference in the distribution of temperature, amount of moisture, rain and snow etc. Therefore, natural vegetation of any region is considered as the mirror reflection of the climate of that region.

(A) NATURAL VEGETATION

Natural vegetation includes all those trees, shrubs, plants and grasses etc. which grow without human interference. Before studying it, the knowledge about related terms like flora, vegetation and forests is necessary. Flora includes different species of plants that grow at a specific time in a particular area. The bushes, plants, grasses etc. that grow at a place under a particular environment are known as vegetation. Whereas dense, closely grown trees, plants, shrubs, grass etc. found over a vast area are called as forests. The word forest is used mostly by geographers, administrators and forest guards, in view of the economic benefits and conservation of environment.

Each type of developed vegetation had to maintain a delicate balance with its environment to cover a long life-cycle, which depends on its qualities such as mutual cooperation and adaptability according to the season. Entire flora found in our country is not local. Rather, 40% of it consists of foreign species, which are known as Boreal or Paleo-Tropical species. These species came to India with the movement of people from Sino-Tibetan, North African and Indo-Malaysian regions. Respectively, these are mostly found on the southern slopes of Himalayas, northwestern Great Plain, northeastern states and group of Nilgiri hills in the south. Many plants of the foreign species were brought as ornamental plants for the gardens in the country. But due to hot and humid climatic conditions, their number increased so much along rivers, tanks, canals and choes that after some time it became very difficult to check their growth. These foreign species not only hampered the growth of local vegetation but also reduced the useful lands and they are also proving harmful for spreading diseases. Due to their harmful effects only water Hyacinth plant spreads into the water sources and is known as the "Terror of Bengal". Similarly, Lentana plant has quickly covered and deeply influenced the green pastures and natural forests of the country. Parthenium or congress grass has also spread

widely in the country and has increased the incidence of diseases like allergies, skin diseases and breathing problems. The wheat imported from the foreign countries during periods of shortage has also brought many unwanted weeds which are spreading fast and a lot of money is being spent on purchase of chemicals needed to eliminate them.

In this way we could say that natural vegetation of our country has not remained natural. Rather factors like fast growing population, shifting agriculture, overgrazing of pastures, indiscriminate felling of forests for fuel and timber etc. have either destroyed a large part of the natural vegetation or have transformed it. The natural vegetation growing according to local climate and soil, is restricted only to the north Himalayan region, western Thar desert and inaccessible hilly areas of Bastar-Koraput.

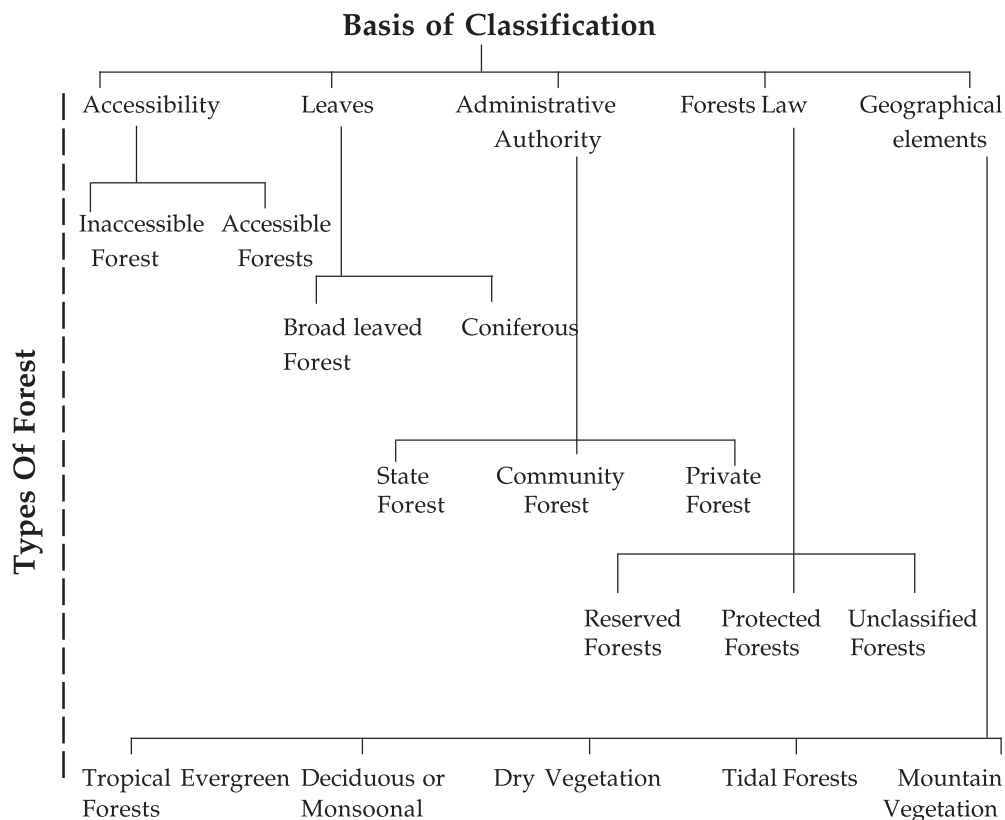
EXTENT OF NATURAL VEGETATION

For economic development and ecological balance it is essential for every country that at least 33% of its land is covered with forests. In the world, 29.5% of the total land is covered with forests, whereas in India only 74.1 million hectares or 22.7 % of the total area is under forests. This is much lower than the 33.3 percent which is fixed by "National Forest Policy" of 1951. Currently, the area under forests is a little more than the one-fifth of the total area of the country. As compared to the world as a whole, India has a per capita forest area of only 0.14 hectares, whereas in Canada it is 22.7 hectares, in erstwhile Soviet Union 3.75 hectares, in Australia 2.85 hectares, in Myanmar 1.64 hectares and in USA 1.44 hectares. Not only the area under forests is less in our country but also the annual production from them is very low as compared to other countries of the world.

Also the regional distribution of the limited available forest area in the country is very uneven in peninsular plateau and its hills, as much as 57% of the country's area under forests is found. After this come the Himalayas where it is 18%. The western ghats and western coastal areas as well as the eastern ghats and eastern coastal areas each share 10 percent. Lowest percentage of country's forested area that is only 5% is found in the great northern plains of India.

At state level also, high proportion of forest area is found in Tripura (59.6%), Himachal Pradesh (48.1%), Arunachal Pradesh (45.8%), Madhya Pradesh and Chhattisgarh (32.9%) and Assam (29.3%). Whereas less than 15% of land is under forests in states like Punjab (2.3%), Rajasthan (3.6%), Gujarat (8.8%), Haryana (12.1%), West Bengal (12.5%) and Uttar Pradesh (13.4%). Under Union Territories, highest area (94.6 per cent) under forests is found in Andaman and Nicobar Islands and lowest (2.1%) in Delhi. The facts stated above clearly indicate that mountain states have more forests and there is great scarcity of these in the plain areas. This has made the problems of soil erosion and underground water level more serious. Therefore, there is an urgent need to increase the area under forests in the northern plain states.

Model 4.1 : Classification of Vegetation and Types of Forests



TYPES OF NATURAL VEGETATION

The natural vegetation found in India can be divided into many types on the following different bases : i) accessibility ii) shape of leaves iii) administrative control iii) forest law, and iv) geographical elements (see Model 4.1)

(i) On the basis of accessibility, 18% of the forest areas of India are such which are situated on the high slopes of Himalayas, due to which they are beyond the reach of human being or are inaccessible. We are able to utilize only 82% of the total forest area.

(ii) Similarly, valuable conifers with pointed leaves, extending over 5% of the total area under forests, are situated on the undulating slopes of the Himalayas and are inaccessible because of lack of transportation facilities, and therefore remain almost unexploited. Only broad-leaved deciduous forests of Teak and Sal are utilized by the people of the country, which account for 95% of the forest area.

(iii) Thirdly, on the basis of administrative control, forests are categorized under three heads, keeping in view the uncontrolled felling of forests and their

conservation. According to this, 95% (717 lakh hectares) of the forests are state forests, on which the government has total control. Besides these, those forests which come under the jurisdiction of local municipal and district councils, and account for 3% (20 Lakh hectares) of the forest area and are known as the community forests. Remaining 2% (9 lakh hectares) forest area belongs to the common people and is called Private Forests.

(iv) Forests are again divided into three parts on the basis of their proper utilisation, control and legal protection. Firstly, in India, 52% (394 lakh hectares) of the forest area is reserved for controlling soil erosion, conservation of environment and regular supply of timber. Cattle grazing and cutting of fuel wood are strictly restricted in these reserved forests. Secondly, 32% (233 lakh hectares) of the forests are protected forests, whose exploitation is completely restricted by the government, but are largely open to the people for getting grass, fuel wood and grazing of cattle etc. Third category includes, 16% of the unclassified forests, which have attracted little attention of the government. Various facilities are available for the people in these forests.

(v) Besides above given basis, the classification of forests is also indirectly influenced by the geographical elements. No doubt India has tropical monsoonal climate but due to variations in rainfall and relief the natural vegetation in the country varies from equatorial evergreen vegetation to Alpine vegetation of cold regions. On the basis of elements of environment, this can be classified into following divisions:

- (I) Tropical evergreen vegetation
- (II) Deciduous or Monsoonal vegetation
- (III) Dry Vegetation
- (IV) Tidal or Mangrove vegetation
- (V) Mountainous vegetation

(I) Tropical Evergreen Vegetation: This type of vegetation is found in areas of high rainfall. Therefore, it is also known as the rain forests.

- (a) **Area:** These forests extends over (i) the western parts of western ghats; (ii) Andaman, Nicobar and Lakshadweep Islands; (iii) southern and eastern slopes of lesser Himalayas; (iv) hills of the Shillong plateau; and (v) Assam, and plain areas of Bengal and Orissa.
- (b) **Climate:** In areas of this type of vegetation, the average annual temperature is about 25°C. The annual rainfall exceeds 200 cm. and amount of humidity is in the air is more than 70% throughout the year.
- (c) **Height:** This vegetation is found upto the height of about 1200 metres above mean sea level. The trees are 30 to 60 metres high and their trunk is more than 5 metres thick.
- (d) **Important Trees:** The important trees found in the rain forests are –



mahogany, bamboo, rubber, coconut, pine, rosewood, ironwood, cane, hopea, nagkesar, gurjan, chaplas, mango, chap, machilush and kadam etc.

- (e) **Characteristics:** This type of vegetation is lofty, very dense, multistoried and full of mixed species of trees. The trees do not shed their leaves at one time and hence remain green throughout the year. Their trunks are straight and long but branches are very short. After the tree height of 30 metres, the branches spread all around and take the form of a canopy, so that maximum sunlight can be absorbed. The ground is mostly marshy and dark without any sunlight. There is lot of undergrowth mainly of entangled mass of vegetation like small shrubs, climbers, canes and ferns. Some times other plants grow on the stems of trees, which is known as xerophytic growth. Due to their dense canopy, they become the habitat of variety of birds and wild animals. Though this is hardwood type of vegetation but being very dense, lack of pure stands and swampy ground conditions, it is not easy to exploit these forests and also due to the lack of transportation facilities, their full economic benefits have yet not been realised. But large exploitation of these forests by the Britishers during the two world wars; secondly now a days their deforestation to fulfil the needs of increasing population and shifting type of agriculture etc. have caused a great damage to these forests in the country.

(II) Deciduous or Monsoonal Vegetation: This vegetation usually sheds leaves before the beginning of summers in order to check the excessive evaporation. Due to this the trees are saved from dry air and sunlight and are able to survive for long time on the available soil moisture. On the basis of amount of rainfall received, this deciduous or monsoonal vegetation could be sub-divided into humid and semi-arid types of vegetation.

(i) **Humid Deciduous Forests:**

- (a) **Area:** This type of vegetation is found in those four large areas, which receive normal rainfall between 100 to 200 cm. during the year. These are: I) Terai region of Himalayas, II) Vindhya-chal-Satpura mountain region and adjoining Chhota Nagpur Plateau and northeastern hilly states, III) Eastern slopes of Western Ghats, and IV) Southeastern Ghat's Tamilnadu region. In all these areas, trees are less dense but their height reaches upto 30 metres.
- (b) **Species of Trees:** Valuable woods like Shisham, Sal in the northern forest region and Sagon, Teak, and Sandalwood in the south are usually found. Besides, Jamun, Amaltas, Haldu, Mahua, Sakhu, Ebony, Arjun, Dhak, Shahtut, Amla, etc. are also found here.
- (c) **Grass:** Beside these trees, valuable grass 'Sabai' is also found in the Terai region. This grass is used in the manufacturing of paper. However, large tracts of these forests have been cleared for agricultural purposes.

(ii) Semi-Arid Deciduous Vegetation : This type of vegetation is found in regions of low rainfall that varies between 50 and 100 cm.

- (a) **Area :** A long strip of area under this vegetation extends from Punjab through Haryana, southwestern Uttar Pradesh, eastern Rajasthan, Kathiawar and Deccan Plateau alongwith neighbouring areas of central India.
- (b) **Trees:** Shisham or Tahli, Kikar or Babul, Banyan, Haldu etc. trees are found in abundance in this long belt. Valuable trees like Sandalwood, Mahua, Siras and Teak are also found occassionally mixed with other trees at some places. These trees often shed their leaves before the start of summers.
- (c) **Grass:** Thorny bushes and variety of grasses could be seen in these areas for long distances, which look like Savana grasslands. This grass is known as Munj, Kans (reeds) and Sabai.

This vegetation has been excessively exploited due to increasing pressure of population. Trees are being cleared indiscriminately from the lands, which are found suitable for agriculture. Therefore, there is a very strong need of plantation of trees and their conservation in this vast area, so that man and animals like sheep, goat, camels and other hibernating animals do not bring more destruction to this vegetation.

(III) Desert or Dry Vegetation: This type of vegetation is found in desert or semi-desert areas of the country where annual rainfall is less than 50 cm. Due to the scarcity of moisture these trees possess much less foliage. Leaves are glazy, small, pointed and thorny but the roots of these trees are very long.

- (a) **Major Trees:** Kikar, Babul, Jand, Tamarix are found in abundance in these areas. Besides these, vegetation like Rambans, Khair, Pipal, Palm, Khejra, Ber, Aak, Neem, Cactus and grasses like Munj are also found. Due to the scarcity of water, the vegetation is totally absent towards western borders of Rajasthan but with the tree plantation along the Indira Gandhi canal drawn from the Sutlej river in Ferozepur district of Punjab, efforts are being made to make the area green again.
- (b) **Area:** The main areas under this vegetation include parts of Rajasthan west of the Arravali mountains; southern Punjab and Haryana and the interior rainshadow areas of Deccan Plateau.

(IV) Tidal Vegetation: This vegetation is found in the deltaic areas of rivers like the Ganges, Brahmaputra, Krishna, Cauvery, Godavari and Mahanadi where sea water at the time of tides keeps on entering the roots of trees. Due to this the roots of these trees get decomposed and soil becomes marshy. Poisonous insects, pythons, snakes and crocodiles are found in the roots of these trees, which come out from the ground. Therefore this type of vegetation is also called as mangroves, swamps, littorals or Sunderban vegetation.

Here 'Sundari' tree is found in abundance. Therefore, Ganga-Yamuna delta is known as the Sunderbans delta. Besides this, other beautiful trees with valuable wood like pine, canes, coconut etc. are also found in these areas. These trees have various species of climbers grown high on their trunks.

(V) Mountain Vegetation: In India, type of vegetation is found in the Himalayan mountainous region in the north and Nilgiri hills in the south.

- (a) All type of vegetation, available in the whole world, is found in the Himalayan region. On the basis of amount of rainfall these are subdivided into two parts - the eastern and the western.

Eastern Himalayan region receives more rainfall as compared to the western Himalayas. Therefore, about 4000 species of flowers and 250 types of ferns are found here. The natural vegetation found on hill slopes is affected by the difference in temperature and rainfall with increasing height. Upto the height of 1200 metres, mixed trees of deciduous vegetation are mostly found. Within 1200 to 2000 metres, dense evergreen forests are found which include the important trees of sal and magnolia. Trees like cinnamon, amura, chinauli and dilleniya are mostly found alongwith them. With the growth of canes, climbers, bushes, ferns, bamboo, long savana grass etc. alongwith these trees, the vegetation becomes denser. With the decrease in temperature within the height of 2000 to 2500 metres, temperate type of vegetation is found. This includes broad-leafed trees as oak, chestnut, laurel, maple and alder. Between the height of 2500–3500 metres, pointed leafed coniferous and alpine type wild trees are present. Among these, trees with low height like silver fir, pine, spruce, deodar, rhododendrons, blue pine, etc. are included. Beyond 3500 metres height, in areas near the snow line, plants like small natural grasses and flowers etc. grow in abundance.

In the western Himalayan region due to the lower rainfall, upto the height of 1800 metres, temperate trees like Chir (Pine), Sheesham, Saal, Semul, Jamun, Plum etc. are found. Deciduous vegetation is found in areas above Shimla at the heights of 1800 to 3000 metres which includes trees like Deodar, Pine, Blue pine, Oak, Elm, Poplar, Birch etc. Trees like yellow Pine, Silver Fir are also seen. Alpine vegetation like Pine, Juniper, Silver Fir etc. are mostly found above 3000 metres and grasslands are also found with short grasses. The local Gujjars and Gaddi tribes move to these grasslands to graze their cattle during summers.

- (b) Mountain vegetation is also found in the hilly parts of the Deccan plateau. This includes the hilly areas of Bastar, Pachhmarhi, Mahabaleshwar, Nilgiri, Palni, Shivrai and Annaimalai. The combined effect of monsoon winds coming from the Bay of Bengal and Arabian Sea brings rainfall of more than 200 cm. in these hill areas and in Nilgiri hills. Therefore, broad leafed evergreen forests are found upto a height of 1800 metres. Such

forests are known as Shola forests in South India. The important trees are Jamun, Machilus, Maliosoma, Saltis etc. But within 1800 to 3000 metres height, temperate coniferous vegetation is found, which consists of trees like silver fir, blue pine, birch and yellow champa. Mosses and ferns grow on these trees. Above this height only small grasses occur. In all these hilly regions vegetation cover is decreasing and land is increasingly being utilized for agriculture because of which underground water level has gone down. As a result, environmental balance has been disturbed. But now Eucalyptus and Teak plantation is being done in these areas.

IMPORTANCE AND CONSERVATION OF NATURAL VEGETATION

Natural vegetation is invaluable property of the nation in which country's ancient scriptures were written. It has both direct and indirect benefits to the country.

(A) Direct Benefits:

- (1) The country's forests provide benefits of employment to nearly 40 lakh people. Workers are needed for cutting the trees, sawing, transportation of logs, loading of timber etc. Besides these, people working as rangers, forest officers, and forest scientists etc. for the protection, management and conservation of forests also get their livelihood from the forests.
- (2) Forests provide different types of wood to the country which is used for making fixtures, furniture, fuel, paper pulp, paper and coal. Woods of Sal, Teak, Sheesham, Haldu, Palash, Arjun, Mahua from monsoonal forests and wood from Pine, Deodar, Silver fir, and Blue pine etc. from Himalayan region are mostly utilized.
- (3) The government earns about Rs. 1 billion and 80 million of national income annually by giving part of forests on contract.
- (4) Katha obtained from Khair tree is used to prepare medicines for diseases of mouth and throat, Quinine is obtained from Cinchona; medicine is prepared from Sarpagandha shrub to control blood pressure; Bahera, Harar and Amla are used to prepare many ayurvedic medicines.
- (5) Paper pulp is prepared from grasses like sabai, bhabar, and elephanta. Useful extracts are obtained from lemon grass and artificial perfumes are prepared from rosha grass.
- (6) Tanning material is prepared after drying the leaves, barks and fruits of mangrove, gambier, harar, bahera, Amla and kikar etc. Tar wood shrub found in south India is also used for leather tanning.
- (7) Lac (sealing wax) from palash and peepal, silk from mulberry, oil from tung and sandalwood, dhoop and resins etc. from saal are prepared. Grasses like bamboo, canes, coconut grass and sarkanda are used in almost

every house in rural areas of the country for preparing ropes, strings, and for thatching the roofs. Besides these, a large variety of fruits, vegetables and leaves (tej patta) are procured from natural vegetation.

- (8) About 25 million tribals live in the forests of the country.
- (9) Forests are home to the rich and diverse wildlife of the country. Therefore, as many as 80 wild life sanctuaries have been developed on 15,000 square miles area of the country, where animals can live in their natural habitats.
- (10) The green pastures facilitate the grazing of animals.

(B) Indirect Benefits: There is a long list of indirect benefits of forests. Their indirect benefit is that they provide pure and fresh oxygen for the human health. The various indirect benefits of forests are as follows:

- (1) **For Controlling the Rainfall:** In areas of dense vegetation, the amount of humidity is increased due to transpiration from the leaves. The winds blowing over such areas become cooler as a result of which the water vapour starts falling on the surface in the form of rain.
- (2) **Climate:** Dense forests check the increase in temperature during summer and bring increase in temperature during winters. That is why cold and moderate climate is found in such areas, which is pleasant and good for health.
- (3) **Checking the Floods:** Roots of dense vegetation are helpful in reducing the speed of flowing water. As a result, damage through floods is reduced. Secondly, the water absorbed by the roots of plants, percolates into the soil, and hence increases the water table. On the other hand the water easily flows into the rivers with the reduction in the volume of water flowing on the surface.
- (4) **Checking Soil Erosion:** Rain water and fast blowing wind erode the top fertile soil from the land surface which is without any vegetation cover. But roots of trees hold the soil tightly and reduce the intensity of both the elements and thus save the fertile soil from being eroded away.
- (5) **Fertility of Soil:** The dried fallen leaves and twigs of trees form humus or green manure, as a result of which the soil becomes more fertile.
- (6) **Nature's Gift:** Variety of green vegetation presents a beautiful landscape which attracts the people to these dense forest areas for tourism, hunting and even for meditation in order to get mental peace. For example the governments of Punjab and Haryana respectively have developed the places like Chhatbir near Chandigarh and Pinjore near Morni Hills for the people.
- (7) **Boon to Industries:** Dense forests provide a strong base to many industries. These manufacture paper, lac, matchsticks, silk, sports goods, plywood, gum, resins etc. These goods become raw material for other modern manufacturing industries. Besides, skins of birds and animals, meat, horns,

wool, bones, honey gums etc. are also obtained which provide a base to a large number of industries of decoration, textile and candle making etc.

In this way forests are very important for us. They absorb carbon-dioxide and release oxygen which is essential for the existence of both man and animals on the earth. But their uncontrolled felling during recent years has badly disturbed the ecological balance. Due to the removal of vegetation cover from the hill slopes and plains, the problems of regular floods and soil erosion are becoming more serious. The deforestation in the Shivalik hills passing through the northern parts of Punjab, has led to an increase in area under choes or seasonal streams, thereby resulting in increase in the wastelands. At the same time, water level has gone down in the plain areas. As a consequence, problems have started arising for irrigation of agricultural land. Rapidly increasing population of the country, increasing urbanisation, industrialisation and pollution, expanding rail and road networks etc. are some of the major reasons due to which more than 13 lakh hectares of forest area is being cleared every year in the country. That is why serious attention is being paid for conserving the environment. On the basis of National Forest Policy of 1952, to maintain tree cover in 60% of mountainous areas and 20% in the plain areas, Vana Mahotsava is celebrated every year. New programmes are being launched under Five Year Plans for the development of social forestry. Protected forests are being raised along the canals, rivers, roads and railway tracks. In Rajasthan, the soil erosion and forward shift of sand dunes is being checked by growing seven grass on sand dunes. In hilly areas fast growing trees such as eucalyptus and poplar are being introduced to correct the ecological imbalance. Besides all this, we should not only participate in the noble act of plantation of trees every year but also we should fully cooperate in the conservation of forests, keeping in view the magnitude of damage done to them.

B. WILD LIFE

Besides the huge variety of vegetation, the wild –life (fauna) is also found to be equally rich and varied in our country. Actually, there exists a close relationship between the two. There are about 76000 species of wild life found in the country. The country has as many as 2500 species of fish in its fresh and saline waters. Likewise, there are about 2000 species of birds and 400 species of snakes. In addition, amphibians, reptiles, mammals and small insects and worms are also found. Among the mammals we have the stately animal, the elephant. It is typical of hot wet equatorial forests. In our country, it is found in the jungles of Assam, Kerala, and Karnataka where heavy rainfall occurs, and the forests are very dense. In contrast, camels and wild asses are confined only to the very hot and arid areas. Camel is generally the animal of the Thar while wild asses are found only in the Rann of Kuchchh. In the opposite direction, is the habitat of the one–horned rhinoceros. It lives in swampy and marshy lands of Assam and northern parts of west Bengal. Animals like Indian

Bison, the Indian Buffalo and the Nilgai are worth mentioning among the wild life of India. Deer is the characteristic of Indian wild life. It is a very sensitive and beautiful animal. Many species of deer are found in India and most common of these are Chowsenha (four horned antelope), black buck (Indian antelope), Chinkara and deer. Some other important species of deer include Kashmir stag, spotted deer, musk deer and moushk deer.

Among the predators, the Indian lion holds a special place. Barring Africa, it is found only in India. Its natural habitat is confined to the Gir forests of Saurashtra in Gujarat. Besides being the most majestic of all the animals, it is one of the most strong animals in our jungles. The famous Bengal tiger has its natural habitat in the Sundarbans of the Ganga delta. The other major animals belonging to the cat family are leopards, clouded leopards and snow leopards. Clouded Leopards and snow leopards are confined only to the higher reaches of the Himalayas.

The eastern ranges of Himalayan mountains are the home of several fascinating animals, such as wild sheep, mountain goats, the ibex, the shrew and the tapir. Panda and snow leopard are confined only to the higher reaches.

Several species of monkeys are found in India. The Langur is the most common among them. The lion tailed Macaque is a very strange animal. It has hair around the face, which appear like a halo.

In India several species of colourful birds are also found. If tiger is our national animal, the peacock is our national bird. Pheasant, geese, ducks, mynahs, parakeets, pigeons, cranes, hornbills and sunbirds, mostly live near the wet lands in vegetated areas.

Wild life in the country has greatly reduced due to the practice of uncontrolled hunting of wild animals for amusement and destruction of forests for a very long time. This has adversely affected the ecological balance of the country. Keeping in view the importance of bio-diversity, attention is being given to the conservation of wild life in the country. In the conference of UNO held at Stockholm in 1972, the matter was discussed at international level and a lot of awareness has been generated in this regard. In this programme of namely 'Man and Biosphere' the world community was appealed to protect the ecological systems. In this context, the Wild Life Conservation Act was formulated in 1972 in India.

A total area of 83835 square kilometre, which is 2.7% of the entire area of the country and, 12% of total forest area is declared to be under national parks and wild life sanctuaries. Special attention is now being paid on the wild animals which are near extinction. Periodic counting is undertaken at national level to find out the exact number of total birds and animals. Currently there

are 16 reserve areas for tigers in various parts of the country. Similarly, a special project is being run in Assam for the conservation of Rhino. The Great Indian Bustard of Rajasthan and Malwa plateau is yet another endangered species. Even the number of lions had been dwindling for quite some time. This all is a matter of serious concern.

Efforts are being made for the protection and conservation of the great biological diversity of our country. Keeping in view the standard criterion formed by the United Nations, 13 Biosphere Reserves are being set up in the country (table 4.1). Under this scheme the first Biosphere Reserve was established in the Nilgiri hills. Its area is 5.5 thousand square Kilometres, which is spread over the border areas of Karnataka, Tamilnadu and Kerala. It was established in 1986. Under this scheme, every plant and animal species would be protected so that this precious natural heritage can be transferred to the future generations.

In each biosphere reserve, the forest land, the flora and the fauna will be preserved in their natural forms. The neighbouring areas will be utilized for research and experimentation in developing forest and forest products, and the periphery will be used for agricultural research.

TABLE 4.1

Biosphere Reserves in India	
Name of Reserve	States in which it is situated
1. Nilgiri	Tamilnadu, Karnataka, Kerala
2. Namdhapa	Arunachal Pradesh
3. Nanda Devi	Uttrakhand
4. Uttrakhand (Valley of flowers)	Uttar Pradesh
5. Northern Andaman	Andaman and Nicobar
6. Gulf of Mannar	Tamilnadu
7. Kaziranga	Assam
8. Kanha	Madhya Pradesh
9. Nokrek	Meghalaya
10. Rann of Kachchh	Gujarat

The country has 63 national parks, 358 wild life sanctuaries and 72 zoological parks covering 1.3 crore square Kilometres of area.

C. SOILS

Fertile soils had remained the centre of attraction for human beings since the ancient times. Like other countries, the ancient Indus civilization and Aryan civilization too originated and developed on the fertile soils of the river valleys. The present Indian civilization also developed in areas of fertile soils

deposited by the rivers. Deposition of fresh alluvium every year by the rivers and easy availability of water for irrigation have played a major role in the concentration of population and development of agriculture in these river valleys. Because of being an agrarian, our country still depends on soil. Fertile soil fulfils the basic needs of food, clothing and shelter, to the large population abuse of the country and hence has become a very valuable resource. Elements like land, climate and vegetation play an important role in the development of this great resource. As we have discussed in earlier chapters, there exist wide variations in these elements, similarly the soils found in the country are not same everywhere. At some places, ancient hard, stony, hilly and plateau soils are present while newly deposited alluvial soils are present at some other places. Therefore, for a comprehensive study of soils of our country, knowledge about the definition, process of formation, composition and structure, types, erosion, causes of erosion and conservation is essential.

(A) DEFINITION OF SOIL

Soil is defined as an unconsolidated layer of the earth's crust formed of the weathered rock material and organic matter and can support plant life.

The thickness of this layer is found from 15–30 cm from the ground surface to many metres deep down to the bedrock or parent material. Vertical section through the upper crust of the earth is called soil profile. On the basis of colour, texture and size of particles, amount of humus, etc., soil scientists have divided the soil profile into three major layers or horizons as A, B and C respectively. **A-** horizon or topsoil contains humus due to which its colour is black. But in this layer, most of the minerals dissolve and are washed downwards by gravitational pull and get deposited in the layer beneath it. This is called the **B horizon** and is brown in colour. But amount of humus is less in this layer. Then comes the **C – horizon** at the bottom. In this layer no major change is seen in the rock materials separated from the parent rocks and it joins the parent rock. This layer is grey or light brown in colour.

(B) SOIL FORMING PROCESS

The process of soil formation is very slow and long. It takes thousands of years for nature to form one inch of soil on the surface. Various weathering agents keep on breaking the rocks of the earth. Many organic and biochemical processes then modify this weathered material. The organic material consists of both living and decayed plant and animal materials such as plant roots, fungi, bacteria, worms, insects and rodents. These get mixed with the inorganic matter and help in the formation of soil.

(A) FACTORS AFFECTING SOIL FORMATION

The texture of soils of our country is not uniform. Besides the various physical, chemical and biological processes, there are five more elements that interact with each other to form a particular soil type. These are:

(i) **Parent Rock** : In the form of bed rocks, the sedimentary rocks of the

great northern plains of the country, provide the best type of soil largely because of accumulation of different types of minerals. These are followed by igneous rocks of the peninsular plateau region which give rise to zonal soils and which are fertile due to the presence of minerals in them.

- (ii) **Climate:** Colour, structure, texture, size of particles etc. of the soil formed from parent rocks depends on the fact that for how long these have been affected by a particular climate. In regions of wet climate like West Bengal, the soil develops faster due to the faster chemical action and the presence of humus. But fertility of soil gets reduced due to the absence of vegetation in dry areas like Rajasthan. Similarly, in regions of heavy rainfall and fast winds, due to greater soil erosion the fertility is reduced.
- (iii) **Slope:** Besides climate, slope of an area also contributes in the development of soil. In hilly areas with steep slope, the run-off is fast and soil keeps on sliding under the influence of gravitational force. That is why soils are less fertile in slopes in hilly regions than in the river valleys of Ganga, Indus and Brahmaputra. The southern slopes because of being sun-facing have better soils than the north facing slopes in our country.
- (iv) **Natural Vegetation:** This is a major soil forming element, which supplies organic matter to the parent material and helps in the development of soil. But due to the major part of land being utilized for agriculture, the soils of our country lack in this element. The laterite soils, soils near water bodies, and soils of reserved forests have 5 to 10 percent organic matter in our country. In remaining areas, the soils have only less than 1% of organic matter in them.
- (v) **Time:** Besides above mentioned four elements, time is of great importance in the development of soil. Every year humus and organic matter is added to the soils and fertility of soil goes on increasing. The process continues for thousands and thousands of years before a good quality soil is formed.

Thus, five elements such as kind of parent rock, change in climate, diversity of vegetation, slope of the land and age of soil are responsible for the formation and development of soil.

(B) CLASSIFICATION OF INDIAN SOILS

In a vast country like India different types of soils are found due to the wide variety of rocks and climate in different parts of the country. They can be classified on the basis of fertility, irrigation, origin and characteristics. **Firstly**, according to the traditional practice, soils were divided on the basis of production of crops into two groups fertile soil, and (2) infertile soil. Infertile soils were further sub-divided into two parts - the saline and the barren (sandy) soils. **Secondly**, in terms of irrigation, soils dependent on rainfall were known as 'brani', whereas soil irrigated by wells were called 'chahi' and those irrigated by canals, were known as 'nahari'. And soils affected by seepage of river water

were termed as 'sailabi'. **Thirdly**, on the basis of their origin, soils are classified into two categories: (i) Zonal and (ii) Azonal. Zonal soil are also called as the local soil as they are formed on the deeply buried rocks. Azonal soils are also known as the transported soils. These are formed due to the transportation of material from the parent rocks by winds, water, glaciers or sea waves.

But the eight fold classification of soils of India , given by the Indian Council of Agricultural Research, according to the report presented by all India Soil Survey Committee in 1953 is very well recognised. These eight soil types include: (1) alluvial soil; (2) black soil; (3) red soil; (4) laterite soil; (5) desert soil; (6) saline and alkaline soils; (7) peaty and marshy soils; and (8) mountain soils.

(1) Alluvial Soils :

- (i) **Area:** These soils occupy extensive tracts of land of about 15 lakh square kilometres covering 24% of total area of the country. These soils are found in the form of stratified rocks with depth exceeding 500 metres below the ground surface.
- (ii) **Regional Extent:** These soils are found in both the northern and southern parts of the country. In north India, alluvial soil is found in Punjab, Haryana, Uttar Pradesh, Delhi, Eastern Rajasthan, Bihar, West Bengal etc.plains of Ganga-Sutlej river valleys. Besides these areas, this soil is also extended over the valleys of Brahmaputra, Surma valleys of Assam, Mahanadi valley of Orissa, Narmada and Tapti valleys of Madhya Pradesh and deltaic areas of Godavari, Krishna and Cauvery in the South.
- (iii) **Chemical Composition:** These soils have large proportion of salts like potash, phosphorus, lime and magnesium but they are deficient in nitrogen and humus. Soils of north western parts are more porous, light coloured and with sandy -loam soil particles.
- (iv) **Soil Texture:** These soils are formed by the deposition of soil brought down by the rivers originated from the mountain slopes of Himalayas and southern plateau, in layers . Area under alluvial soils is increased by deposition of sediments by wind action in north western regions and by tides on the sea coasts. There are four main regions of alluvial soils in our country: (a) riverine, (b) terai, (c) deltaic and (d) coastal.
 - (a) **Riverine Alluvial Soil:** These soils are found in the river basins. Ganga, Sutlej, and their tributaries have extended these soils in their huge courses, and are divided into two sub -groups:
 - (i) **Khadar Soil:** This is light coloured acidic soil, which varies mostly from clayey to sandy loam in texture. Newer alluvium gets deposited due to the annual flooding. This soil is found in the flood plains and deltaic areas.

- (ii) **Bangar Soil:** It is found in plains which are more than 30 metres above the flood level and where river water does not reach the older deposits. These dark coloured soils have a mixture of sand, silt and clay, in equal proportion. In higher Bangar areas where these have lime nodules in large amounts below their layers, these are called alluvial kankar soils (for example Dadri in Haryana).
 - (b) **Terai Alluvial Soils:** These extend in areas along the Himalayan mountains, in Uttar Pradesh, Bihar and West Bengal. Here rivers flow with great speed through bhabar soils, having big boulders and stones. When the slope breaks to become gentle, fine soil particles are deposited due to which the amount of fine silt increases in the soils of these areas.
 - (c) **Deltaic Alluvial Soils:** This type of alluvial soils have large amount of fine silt and therefore these are less porous, are wet, heavy and rich in humus. These are found in the deltaic areas of all the rivers of India. The Sundarbans delta is the best example where soils are world famous for the cultivation of rice and jute.
 - (d) **Coastal Alluvial Soils:** This type of soils are formed along the coast, with the deposition of disintegrated material by sea waters. These light coloured soils are less fertile due to high amount of sand in them. Their expanse is more on the eastern coast as compared to the western coast.
 - (e) **Importance:** Besides facilitating irrigation by canals and wells, these alluvial soils have contributed greatly in the advancement of agriculture by providing the easily workable soft and fertile layer of soil and availability of underground water in sufficient quantity. That is why, the areas of these soils are also termed as the 'wheat and rice bowls' of the country.
- (2) **Black Soils :**
- (a) **Area:** These soils cover an area of about 5.5 lakh square kilometres in the country. These are upto 8 metre deep below the surface.
 - (b) **Regional Extent:** These soils are found in a triangular area extending from Mumbai (Maharashtra) in the west, Amarkantak plateau in the east, Guna (Madhya Pradesh) in the north to Belgaum (Karnataka) in the south. From this area many off-shoots extend into Andhra Pradesh. Besides, these soils are also found in Bundi and Kota districts of Rajasthan; Coimbatore, Salem, Tirunelivelli and Ramanathpuram districts of Tamil Nadu; and in Bundelkhand region of Uttar Pradesh.
 - (c) **Chemical Composition:** Black soils are generally rich in iron, potash, aluminum, lime and magnesium but are deficient in nitrogen, phosphorus and organic matter.
 - (d) **Characteristics:** These soils are formed due to the disintegration of volcanic rocks. Due to presence of iron and aluminum, these soils are black in colour. Because of higher amount of basalt and clay particles,

they are also sometimes called Regur soils. These are formed with the compaction of hard, impermeable and dark coloured fine particles. With the presence of limestone nodules in the lower layers of these soils, they could retain water for long time. During rainy seasons these become difficult to work as the plough gets stuck in the mud. Similarly, in dry season, cracks upto 15 –30 cm wide and upto 1 metre depth develop on these soils in which, soil from surrounding areas gets collected which increases their fertility.

- (e) **Importance:** Endowed with inexhaustible fertility this soil is helpful in the cultivation of commercial crops. That is why, wheat, sugarcane, linseed, bajra, cotton and citrus fruits are grown successfully. Since they are ideal for growing cotton, they are also called Black cotton soils.

(3) Red Soils:

- (a) **Area:** They cover an area of about 2 lakh square kilometres, with depth to about 4 metres in the plain areas.
- (b) **Regional Extent:** They practically encircle the entire black soil region of Deccan plateau on all sides. These soils extend over whole of Tamilnadu, parts of Karnataka, north-east Andhra Pradesh, Orissa, South Bihar, eastern Madhya Pradesh and north eastern hilly states. Besides, these soils are also found in some districts of Uttar Pradesh and Aravalli mountain regions of Rajasthan.
- (c) **Chemical Composition:** The red colour of these soils is due to the presence iron. These have developed on crystalline and metamorphic rocks which are more sandy and less clayey. They are poor in nitrogen, humus, and phosphorus. But are rich in magnesium, iron and aluminum and so can produce excellent crops like bajra, pulses, cotton, tobacco, jowar and fruits. Particles of granite, schist and gneiss are found in these soils.

These soils are found in areas with low rainfall. On the uplands, these are gravelly, sandy or stony and porous. Under irrigation, these soils provide good production with application of ammonia, superphosphate, compost fertilizers. During rainy season, iron comes on the surface in the form of iron oxides through capillary action, which increases amount of red colour in these soils. Their depth, fertility, colour etc. vary greatly with change in height because of which they are also found in red – yellow and red –brown mixtures etc.

(4) Laterite Soils:

- (a) **Area:** These soils covering 2.5 lakh square kilometres of area, are found over 4% of the total soil area of the country. Their depth is only for few cm and they are found in patches and continuously at some places.
- (b) **Regional Extent:** These soils are well developed on the peaks of the basaltic hills and plateaus of Vindhya, Satpura and neighbouring ranges

in Madhya Pradesh, eastern ghat region of Orissa, hills of western ghats of Karnataka, south Maharashtra, Malabar in Kerala and north & eastern parts of Shillong plateau in the north eastern states.

- (c) **Chemical Composition:** These soils are generally poor in nitrogen, lime, potash, phosphorus, magnesium and organic matter. But due to being rich in iron and aluminum oxides, these soils are acidic in nature and red in colour.
 - (d) **Characteristics:** These are soils of warm tropical regions, where due to heavy rain (more than 200 cm), lime, silica and salts are leached away and so oxides of iron and aluminum are left behind. Its form in which aluminum is more, is called bauxite. The word laterite means brick type and it is used for making bricks. This soil is highly rocky and infertile which soaks the water very easily but due to high amount of silica in lower areas, this soil on mixing with loamy soil becomes fertile. The laterite soils are good for producing crops like topioca and cashewnuts.
- (5) Desert Soils:**
- (a) **Area:** This soil spreads over ancient basaltic rocks over an area of nearly 1.5 lakh square kilometres of the country.
 - (b) **Region:** These extend from Indus valley in the west to Aravalli mountain in the east in the states of Rajasthan, southern Punjab and southern Haryana.
 - (c) **Chemical Composition:** These soils are rich in soluble salts but contain varying percentage of calcium carbonate. This soil is very poor in nitrogen and humus.
 - (d) **Characteristics:** These soils contain 92% sand content and 8% clay content. The origin of these soils is mainly attributed to the continuous deposition of sand brought from the sea-coast (Kachchh) of Gujarat by the fast blowing summer monsoons. Under the influence of sand storms, their very fine particles reach southern districts of Punjab and Haryana in the form of 'Bhur' soils, and sand dunes of large sized particles are left behind. During long dry weather conditions, due to high evaporation and lack of leaching, the salt dissolved in water dries on the upper layer of the soil. The colour of these sandy soils ranges from red to brown generally light brown. These soils are most porous, dry, having large sized particles and less fertile. They are also called Sierozem soils.
 - (e) **Crops:** With irrigation facilities crops like bajra, jowar, cotton, wheat, sugarcane and some vegetables are grown in these sandy soils.
- (6) Saline and Alkaline Soils:**
- (a) **Area:** The saline and alkaline soils cover an area of about 1.53 lakh square kilometres in the interior and coastal parts of the country.

- (b) **Region:** These are found in small patches in the states of Uttar Pradesh, Rajasthan, Haryana and southern parts of Punjab. Small pockets of these soils also occur in Rann of Kachchh on the sea coast; gulf of Cambay; near the mouths of Narmada, Tapti, Mahi, and Sabarmati; in the Dharwar and Bijapur districts of Karnataka; Goa and Tamilnadu and in coastal areas of Orissa.
- (c) **Chemical Composition:** Saline soils are although rich in sodium content, but have large amount of calcium, magnesium and nitrogen in mixed form. Alkaline soils are deficient in calcium and nitrogen. They are highly impervious and have a very low water holding capacity.
- (d) **Characteristics:** In the interior areas saline soils originate due to poor drainage and higher sub-soil water table. The salts in solution percolate in the soil and go on accumulating. But during dry season, due to capillary action, these salts come to the surface and are deposited there as a white layer over the soil surface. This type of soils are known by different local names such as Usar or Reh in Uttar Pradesh, Kallar or Thur in Punjab and Rakkar, Karl and Chopan in other parts of the country. The texture of these soils is sandy to loamy sand.
- (e) **Importance:** By employing improved methods of irrigation and with application of lime and gypsum, wherever needed, these can be improved by growing crops like berseem, rice and sugarcane can be cultivated.

(7) Peaty and Marshy Soils :

These soils are found in humid regions over an area of only 1500 square kilometres. These are found in Sunderbans delta, coastal areas of Orissa, south eastern coastal parts of Tamilnadu, central Bihar and Almora district of Uttar Pradesh. As a result of accumulation and decomposition of large amount of organic matter, these are black in colour and highly alkaline/acidic in nature. That is why peat (type of coal) soils are also known as 'Kari' soils in Kerala in which many salts are dissolved. Due to the presence of iron contents in organic matter, these soils sometimes become blue coloured heavy soils. During monsoons, these soils are generally submerged under water, and hence are put to paddy cultivation after the rains stop.

(8) Mountain Soils :

These soils cover on 7.2% of the total soil area of the country. These are shallow on the mountain slopes. But in valleys or gently sloping hill sides, their depth varies from few centimetres to 2 metres. These pervious soils have large proportion of sand, gravel, pebbles and soluble organic materials. These are deficient in lime but rich in iron and hence are ideal for the cultivation of tea. That is why they are also known as 'tea soils'. Due to growth of natural forests on them on the mountain slopes, these are also called the 'forest soils'.

The mountain soils are found in lower and middle ranges of the Himalayas especially in Assam, Ladakh, Lahaul –Spiti, Kinnaur, Darjeeling, Dehradun, Almora, Garhwal and in Nilgiri hills in the south.

Their colour and character changes with height. Upto an elevation of about 1800 metres in the hot sub-tropical belt of the Himalayan slopes, the brown coloured, acidic forest soils are found, due to the decomposition of deciduous vegetation. Between 1800 and 3000 metres of elevation, the temperatures are low and poorly decomposed coniferous vegetation convert these soils into grey-brown podzolic soils. In areas of higher elevation, alpine meadow soils occur above the timber line. These are shallow, dark in color and sandy-loam or sandy-silica in texture. The organic matter is not decomposed in these soils due to sharp fall in temperature.

(E) SOIL EROSION

The removal of top 15 to 30 cm thick layer of soil by natural agents such as water, wind, glaciers and by man is called soil erosion. Usually, it is of three types:-

- (i) **Sheet erosion:** In this type of erosion, thin sheet (layer) of soil is eroded uniformly from a large area by wind or running water.
- (ii) **Mill erosion:** During heavy rainfall, water flows forming narrow channels along the slope of the land. Many finger shaped grooves are formed over the surface.
- (iii) **Badland or Gully Erosion:** In some areas, deep ravines are formed after the soil is blown out by wind or is eroded deep by water. These ravines increase in size if the erosion continues.

Different parts of the country have been affected by these three types of soil erosion.

Areas of Soil Erosion:

Following parts of the country have been severely affected by this problem:-

- (i) In outer Himalayas (Shivaliks), the natural vegetation has been removed indiscriminately due to which huge amounts of soil has been removed to fill the river valleys. This has resulted into floods which have caused great damage to the fertile land by depositing sand and water in low lying areas. At the same time, in hilly parts land slides increase.
- (ii) In Hoshiarpur and Ropar districts of Punjab; Yamuna; Chambal; catchment areas of Mahi and Sabarmati rivers, the choes and streams have made the land barren due to lack of vegetation.
- (iii) In the arid regions of south Punjab, Haryana, and eastern Rajasthan; western Uttar Pradesh and north western Gujarat, the soil has been eroded by fast blowing winds.
- (iv) In the north eastern states including West Bengal, due to erosion through heavy rainfall, floods and side cutting of river banks, hundreds of tonnes of soil is dumped into Bay of Bengal.
- (v) In the south and south eastern India, soil erosion takes place due to steeper slopes, heavy rainfall and faulty methods of cultivation.

Causes of Soil Erosion

Soil erosion is caused due to physical factors such as high temperature, snow storms, thunderstorms, heavy rainfall, steep slopes, sandy soils etc. Cultural factors like uncontrolled deforestation and overgrazing of pastures by animals; shifting cultivation; faulty methods of cultivation; rapid expansion of transportation, communication and canal networks; mining etc. also lead to erosion of soil.

Soil Conservation

Soil is a precious resource, which is transported from one place to another by action of winds and water. To protect it from this loss and to conserve the fertile soil is moral duty of all of us. Therefore, the government has paid special attention to the problem of soil erosion by establishing Central Soil Conservation Board in 1953 and the state governments established Soil Testing Laboratories. Besides these, targets are set for the conservation of soil in every Five Year Plan. Trees are planted in rows to create windbreaks and shelter belts to reduce velocity of winds in Punjab, Haryana, Rajasthan, Gujarat, Uttaranchal and Uttar Pradesh. Also the trees like Dhak, Kikar and Khejri are being planted and suitable grass is grown on the sand dunes to check their expansion. The Indian Army has made a significant contribution in this regard. Similarly, in hilly areas, contour ploughing and terrace cultivation is practised and small water reservoirs are made. In plain areas, soil can be conserved by covering it with vegetation, crop rotation, and by using manures. In the hilly areas, conservation of soil is being done by controlling the unrestricted grazing by sheep, goats and other animals and by afforestation. Jharkhand government has made strict regulations for shifting cultivation in the Chhota Nagpur plateau region.

In the end, besides the government, it is the moral and religious duty of all of us to protect the soil resources around us.

Exercise

I. Answer each of the following question in brief :

A. Natural Vegetation:

1. Give the names and quantity of foreign species of natural vegetation existing in our country.
2. Which vegetation type is known as "Terror of Bengal"?
3. What percentage of land in India is covered under forests as compared to the whole world?
4. In which State and Union territories the areas of maximum and minimum forest land fall?
5. Which are State forests?
6. Name some trees of Tropical Evergreen vegetation.

7. Which factors destroy the semi-arid deciduous vegetation?
8. Give the names of trees and areas of arid vegetation.
9. What are the other names of Tidal vegetation?
10. Name the trees found at an elevation of above 2500 metres in Eastern Himalayas.
11. In which areas does Mountainous vegetation grow in Deccan Plateau?
12. Which trees are used for making Health Medicines?
13. Which trees are used for leather tanning?

B. Animal Life:

1. How many different types of animals could be there?
2. What type of areas are liked by Elephants to live in?
3. Which species of deer are found in India?
4. Where are lions found in India?
5. Name the animals which are found in the Himalayas.
6. Name the National Animal and Bird of India.
7. Which species of animals are endangered?

C. Soils :

1. Define Soil.
2. How is Soil formed?
3. Which are the basic elements of Soil?
4. Which chemical elements are found in the Black Soil?
5. Where are laterite soils found in India?
6. Where are 'Bhur' Soil found?
7. What are different names of saline soils in different parts of the country?
8. In which areas of India are the soils suitable for cultivation of Tea found?
9. What is meant by Soil erosion?
10. What different measures are taken to check the forward extension of desert?

II. Answer each of the following questions in short :

A. Natural Vegetation:

1. Why has foreign vegetation become a problem for us? Elaborate with examples.
2. How could foreign plants be harmful for us?
3. What are the main reasons for our natural vegetation not remaining actually natural?
4. Write a short note on Deciduous or Monsoonal Vegetation.
5. What type of vegetation is found in east Himalayan regions?
6. How does natural vegetation act as a boon for industries?
7. What have been the implications of indiscriminate cutting of forests in the country?

B. Animal Life:

1. What steps are being taken for protection of Animal Life in India?

C. Soils

1. What is the contribution of Primary Rocks in the formation of soils?
2. What should be done to increase the fertility to Soil?
3. Write a short note on Peat and Marshy Soil.
4. What are different types of Soil erosion?
5. What are the agents of soil erosion?

III. Answer each of the following questions subjectively :

1. Explain the classification of natural vegetation of India on various bases.
2. How is natural vegetation classified on the basis of geographical elements in the country?
3. Describe the benefits of natural vegetation to the country.
4. Which elements determine the texture of soil?
5. Discuss the various types and characteristics of soils found in India.
6. What is Soil erosion? Why is it caused? What is its regional distribution? How can it be checked?

IV. Show the following map on the of India:

1. Areas of arid vegetation.
2. Mangrove Vegetation Area.
3. Areas of Black and Alluvial Soils.

CHAPTER 5

LAND UTILIZATION AND AGRICULTURE

The total area of the country is about 32.8 crore hectares. The land utilization statistics are available for nearly 92.7% of the total area. India is among those few countries where agriculture is being practised for thousands of years in the plains of rivers. Since ancient times, large part of the country is suitable for agriculture. According to (Statistical Abstract) the statistics of 2019, the net sown area in the country was 14.16 crore hectares, while this was 11.88 crore hectares in 1950 –51. In this way, net sown area has increased more than crore hectares in the last 6.5 decades. In other words, more than 2 crore hectares of additional land has been made fit for agriculture. Thus, more than half of the total area is now available for cultivation. No other big country of the world is so fortunate as we are in this regard.

Land Use in Major Countries of the World (in Percent)

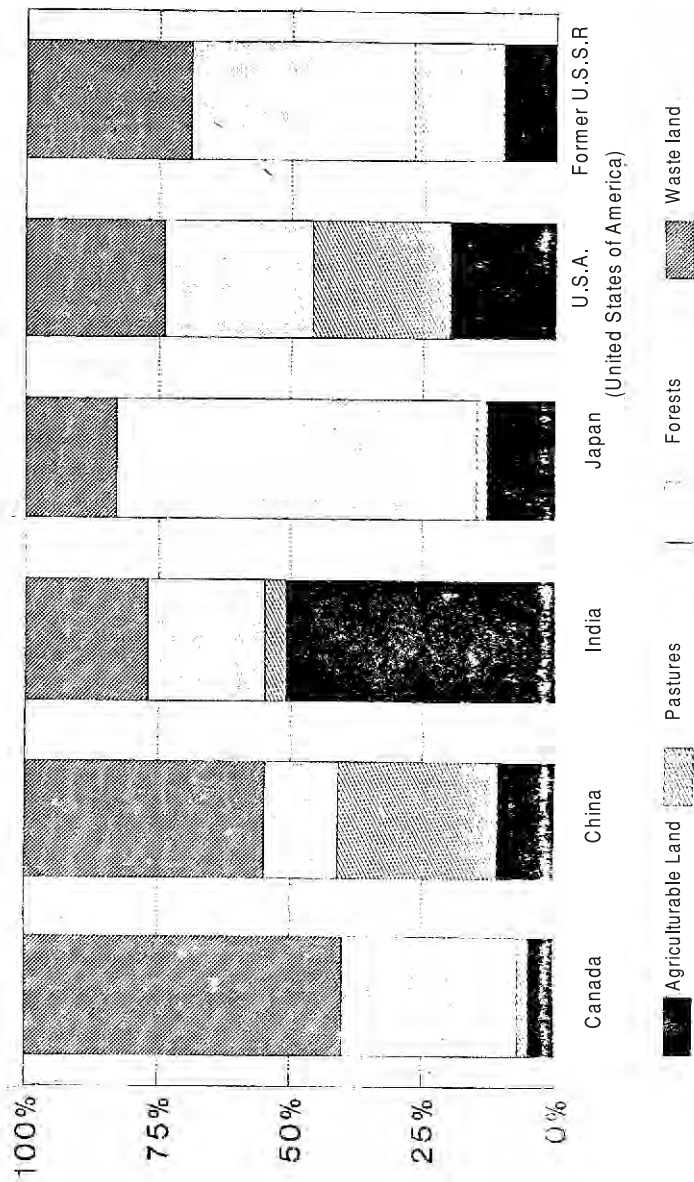
Country	Cultivated Area	Pasture Land	Forested Land	Waste Land	Total
Canada	5.0	2.0	33.0	60	100
China	11.0	30.0	14.0	45	100
India	51.0	4.0	22.0	23	100
Japan	13.0	2.0	68.0	17	100
USA	20.0	26.0	28.0	26	100
Former USSR	10.0	17.0	42.0	31	100

Land Use Pattern of India

As already mentioned, by the year 1998, nearly 2.32 crore hectares had been added to the net sown area over past four decades in India. Net sown area constitutes 51.09% of the total reported area. Only 1.0% of the area is under trees and groves. The fallow land constitutes 3.6% of the total area. It is that land which is not sown every year rather once in two or three years. It includes that land also which is kept fallow for a season or two and such land is known as the current fallow. The land left fallow for more than a year is called as the old fallow land. Thus nearly 51% of the total area is cultivated.

The area under culturable waste-land has remained between 5% to 6% in the past few decades. But the land under permanent pastures is decreasing. This is due to the increasing population. To fulfill the food requirements of

Land use in Major Countries of the World



this population land under pastures is being converted into agricultural land. On the other hand, urban and rural settlements are also expanding with the increasing population. With the fast increase in the developmental activities, a large area is being utilised for non-agricultural uses such as roads, railways, canals, industrial and irrigation projects. In 1998, nearly 7% of the total area was under such non-agricultural uses, while it was less than 4% in 1950-51. Although, the demand of land for these uses can not be neglected but protecting agriculturally fertile land through planned efforts, is necessary.

Comparison of Land Use in India and Punjab

	Land Use Category	India	Punjab
	Total area (according to the available statistics)	100	100
(i)	Forests	21.67	5.76
(ii)	Area put to non-agricultural uses	8.7	7.90
(iii)	Barren Land	5.5	1.77
(iv)	Pastures Land	3.3	0.12
(v)	Land under trees and groves	1.0	0.24
(vi)	Culturable Wasteland	4.0	0.48
(vii)	Fallow Land	3.6	1.49
(viii)	Net Sown Area	45.5	82.24

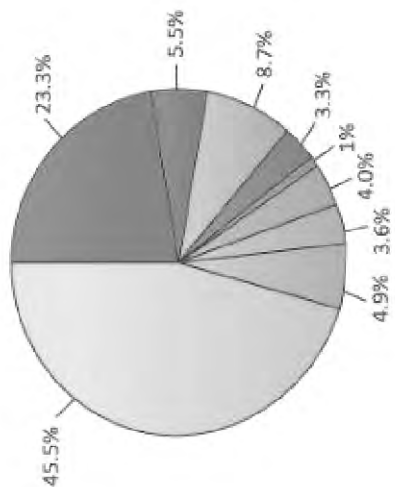
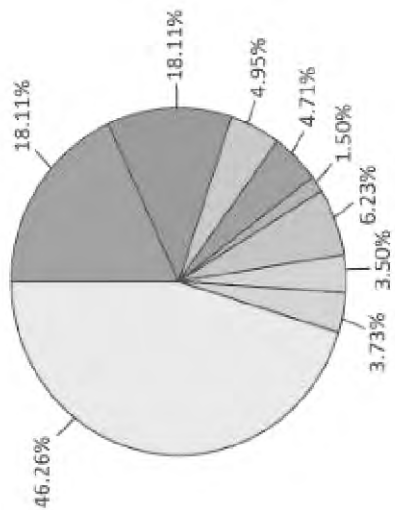
Source : Punjab Government: Statistical Abstract of Punjab, 2001, Economic Adviser of Punjab Government, Chandigarh, pp. 162-165. Economic Survey 2014-15

The country has 21.67% of its area under forests, which is much below the required of 33% norm. For a self-reliant economy and for maintaining proper ecological balance, at least one-third of the total area should be kept under forests and natural vegetation. According to available data, forested area in the country has increased after independence. In 1950 -51, forests accounted for only 4 crore hectares or 14.2%, which increased to 6.9 crore hectares or 22.6% in 1997-98 and to 7.12 crore hectare in 2019. In spite of that, area under forests is less by nearly 10 percent than the standard forested area.

There are many important advantages of increase in the forested area. A larger area under forests makes important contribution by maintaining the ecological balance and absorption of carbon dioxide. The increase in the amount of carbon dioxide in atmosphere leads to the increase in the green house effect. This in turn would raise the atmospheric temperature at the global level. The increase in the temperature will result in the melting of ice caps leading to rise in sea level endangering the low lying thickly populated coastal regions of the

General land use categories-1960-61 General land use categories-2014-15

Reporting Area : 100 per cent



- Forest
- Barren and unculturable waste land
- Area under non-agricultural uses
- Permanent pasture and grazing land
- Area under misc. tree crops and groves

- Culturable waste land
- Fallow other than current fallow
- Current fallow
- Net sown area

world. Besides this, forests provide habitat to the wild life. They help in raising the amount of precipitation and minimising the incidence of droughts. Forests conserves not only water but also protect soil as well. In this way, they help in reducing the destruction by floods of the rivers.

About 2 crore hectares of land in India is not being utilized at this time. This land is classified as barren land. This includes the arid, rocky and sandy deserts. The high mountainous and barren lands also belong to this category. At times human beings are also responsible in increasing waste lands by their destructive activities like deforestation and over grazing. There has been a remarkable decrease in area under wasteland in the country. However, it is notable that the wasteland has declined to 6.2% (1997-98) from the earlier figure of 12.8% in the year 1950 -51 while reduced to 5.5% by 2014-15. In this way, wasteland has decreased to half in the last four and a half decades.

In our own state Punjab, the land utilization statistics are available to us for 50.3 lakh hectares, which is nearly 99.9% of the total surveyed area of the state. In a way, except for 3 thousand hectares of area, land utilization statistics are available for whole of Punjab. Total net sown area in Punjab is 82.2% whereas it is only 47% for the country as whole. However, the area under forests is only 3.67%, whereas this average for the whole country is 22.6%. In this way, Punjab has very little area under forests and scientifically it needs an additional 27% land to be brought under the forests. Severe lack of forests and high proportion of land under the net sown area has adversely affected the ecology of the state. In recent years, the state's intensive commercial agriculture has faced ecological problems. Problems like fall in the underground water level, increasing salinity of soils, water logging and reduction in fertility are being faced in some parts of the state. Due to higher standard of living and high economic development level, the use of land for non-agricultural purposes is 7.9% whereas this average for the entire country is 7.4%.

Contrary to it, percentage of wasteland is very less as compared to the national average. The area under wasteland in Punjab is 1.8 % of the total agricultural land, whereas this average for the entire country is 6.2%. Similarly, culturable wasteland in the state is half percent whereas in the country it is 4.6%. Clearly, most of the available land in Punjab is being utilized for agricultural purposes. This proves the predominance of agriculture in the state.

In the end, we can say that the land available for agriculture in the country is limited, and it can neither be increased nor decreased. In view of the increasing pressure on land, it is essential to plan for the use of available land. This is possible only by adopting suitable measures to check soil erosion, desertification, salinity and submergence of soils, etc. By doing this, some of the wasteland may be brought under alternative uses. Similarly, by using modern and scientific methods of farming, the productivity of the land can

also be increased. Above all, attempts should be made to strike the balance between various uses of land. This is necessary for the agricultural development of the country. In the following pages, we shall study the agricultural development in the country.

AGRICULTURAL DEVELOPMENT

Contribution of Agriculture in the Indian Economy

Agriculture is the mainstay of Indian economy. About two-thirds of the workers gets employment from the agricultural sector. This sector provides 19.9% of the national income. In foreign exports too, agricultural products have an important place. Many products from agriculture are being utilized in the form of raw material in our industries. With the development in the agricultural sector, per capita availability of foodgrains, which was 395 gm in the year 1950 has increased to 510 gm in 1991 and further to 14.9 kg per capita in 2020. In terms of use of chemical fertilizers also, India ranks fourth after USA, erstwhile USSR and China. The area under pulses in our country is highest in the world. In the production of cotton also, India ranks first among the countries where attempts were made first of all for producing good quality cotton. The country has attained important achievements in preparing the seed of Zinga fish and in developing technology for pest culture.

The average rate of growth of agricultural production in the country has remained at 2.7% per annum between 1949-50 to 1997-98, whereas population growth rate had been about 2% per annum. This growth rate of agriculture disapproves the concept of Malthus and his disciples, who believed that the foodgrains production increases in arithmetic progression ($2+2+2+ \dots$) and population increases in geometric progression ($2 \times 2 \times 2 \times \dots$) in the world. The production of foodgrains in the country has increased more than three times after independence, that is, it increased from 549.2 lakh tons in 1949-50 and reached to 1933 lakh tons in 1997-98. Diversity has occurred in the crop rotation. Area under commercial crops has rapidly grown for increasing the exports and to fulfill the domestic demand. During post-green revolution years (1967-68 to 1997-98) the average growth rate of agriculture sector has been 2.84% per annum.

During this period, production of foodgrains has increased from 950.5 lakh tons to 1933 lakh tons, like Summer Moong, Soyabean, Sunflower, etc., have increased in the cropping pattern. Production of edible oils has also increased. Their production was 9.47 lakh tons in the year 1987. Some important statistics related to agriculture are given in the following table.

India : Increase in Production of Foodgrains, 1950 to 1997-98

(Production in Lakh tons)

Crop	1950-51	1970-71	1990-91	1994-95	1997-98	2020-21
Rice	206	422	743	818	821	3,500
Wheat	65	238	551	658	660	3,900
Other cereals	154	306	327	299	316	2,690
Total cereals	425	966	1,621	1,775	1,797	-
Total Pulses	84	118	143	141	133	250
Total Foodgrains	509	1,084	1,764	1,916	1,933	2,966.5

Source: (i) India : A Reference Annual : Govt. of India, New Delhi, p. 388

(ii) Economic Survey : Govt. of India, New Delhi, Year 2020-21.

In the above table, only food crops have been mentioned. But agricultural sector is not confined only to the cultivation of crops. Rather it also includes livestock raising, fishing orchard farming and forestry. Natural resources has a very special role to play in the agricultural sector. With the favourable climate and fertile soils developed agriculture can be done. In this regard, nature has been very kind to India. In the world, only one-tenth of the total area is fit for agriculture, whereas, in India two crops in a year are grown due to favourable climate. The area that can be brought under irrigation in India is almost equal to the total area available for cultivation in China.

However, inspite of the favourable physical conditions and the developments that have been taken place during these years, Indian agriculture is suffering from certain basic problems.

Main Problems of Indian Agriculture

The biggest problem of Indian agriculture is perhaps the tremendous population pressure on it. Following statistics would clearly reveal this fact. Nearly 65% of total workers and their families, in the country are dependent on agriculture for their living. This large section of the population shares only 29% of the gross income of the country. Second example of the heavy population pressure is that the density of population in the country is 264 persons per square km which is very high in itself. But the agricultural density is almost double (432 persons per square km) of it. It is due to population pressure only that even the infertile land has been brought under cultivation. Terraced farms can be seen in the higher hilly and mountainous areas. Forests and tree groves have been removed for extending the cultivation. For example, in the Uttarakhand region of the Uttaranchal, cultivation is done on lands having a slope of even more than 60%.

This has given rise to environmental problems such as soil erosion, flood and drought, etc. The per capita availability of cultivated land has come down to only one-fourth of a hectare. And when our population is stated to double in the year 2026, this per capita availability of land would further slide down to one-eighth of a hectare.

Most of the landholdings in the country are small, and are highly unevenly distributed. Due to this social tensions, violence and discontent have increased. It is important to note that nearly 58% of the landholdings in the country are less than one hectare in size. These cover only 2% of the cultivated area. On the other hand, landholdings of 10 hectares or above size category constitute only 2% of the total holdings. But these occupy more than one-fourth of the total cultivated area.

Due to smaller and very small size of most of the landholdings, these are not economically viable and efficient. Small farmers work very hard on their land to increase productivity, but their net profit is very less. It is so, because they have to hire tubewells for irrigation and other agricultural equipment from the big farmers and have to buy expensive chemical fertilizers and pesticides from the market. As a result, the actual saving of the small farmers gets reduced. Due to these reasons, Indian agriculture has been given regarded as subsistence agriculture.

Due to the decline in forests and pastures, soil erosion is enhanced and natural fertility is adversely affected. Besides this, most of our farmers are illiterate and they are not able to adopt crop rotation scientifically. It also reduces the fertility of soil. The third important factor for reduction in fertility is the practice of intensive agriculture in which one crop or the other stands always in the fields. Due to this, the soil nutrients like zinc, manganese and iron get exhausted. The farmers have to use chemical fertilizers frequently in order repeatedly to maintain the fertility of soil which in the long run affects the natural fertility of soil.

To develop agriculture in the country, it is important to check the continuous fragmentation of landholding; to give preference to land consolidation; to practice agriculture on scientific lines; to stress on the use of organic fertilizers; to get the soil tested after short periods; to encourage multiple cropping and mixed agriculture; and to utilize the sources of irrigation rationally. By adopting these measures, income from the agricultural sector can be increased.

Another kind of problem relates to irrigation. Whereas, at the national level only, 35.3% of the cultivated area is being irrigated in the states like Punjab, on the other hand, 92.3% of area receives irrigation. Thus, while there is large scope of increasing irrigation facilities in states like Rajasthan, Maharashtra, Madhya Pradesh and Karnataka, at the same time in states like Punjab, the problems of water logging and salinity are increasing. In Ferozpur

district alone, more than one lakh hectares of land has been affected by water logging.

A new problem that has arisen in regard to agricultural productivity is that after the green revolution the agricultural productivity has rapidly increased in areas of green revolution like Punjab, Haryana and Uttaranchal, while it has recorded a decline in case of eastern rice producing states like Bengal, Orissa, Bihar, Jharkhand and Assam. As a result, regional imbalances in agricultural development have increased. The government has started taking steps in this direction since from the 7th Five Year Plan (1985-90). Another fact is that during the past few years, agricultural production in areas of green revolution has started showing signs of stagnation. The production could not increase at the rate at which it started increasing in the beginning of the 1970's and 1980's for this there is a strong need of another technical breakthrough in the agricultural sector.

After green revolution, the farmers adopted those crop rotations, which became more remunerative. Specialization in agriculture is being emphasized. Perhaps this is because the farmers of green revolution regions like Punjab and Haryana have adopted the crop rotation of wheat-rice and the farmers of western Uttar Pradesh have adopted the wheat-sugarcane rotation. This has damaged the diversity in cropping pattern and has led to considerable reduction in the production of pulses and oilseeds. The daily per capita consumption of food grains in the country has although increased from 334.2 gm in 1951 to 468.5 gm in 1995 but during the same time period, the consumption of pulses had decreased from 60.7 gm to 38.1 gm per capita per day.

Still another problem of agriculture in India is the decline in investment in this sector. This investment has declined both in the private and the public sector. Neither the farmers are making any new investments in the agriculture for the past few years nor the government is paying any serious attention towards increasing the infrastructural facilities in this sector. Total public sector investment in the agricultural sector has decreased from Rs. 1769 crore in 1980-81 to Rs. 1002 crore in 1991-92. This is a matter of great concern. Government has however, taken some important steps to increase the investment in the public sector under 8th five year plan (1992-97).

Besides this, under the various Five Year Plans, the government has taken initiatives to convert Indian agriculture from subsistence agriculture to a self-reliant and progressive industry. The zamindari system has been abolished by executing various laws. With this, the intermediaries, between the government and the landowners, have been removed. In many areas, fragmented holdings have been consolidated into larger landholdings by implementing land consolidation laws so that the farmers are able to take proper care of their farms alongwith the establishment of facilities for irrigation. The cooperative movement is being encouraged in order to enable the farmers to

solve their problems of credit and sale of agricultural produce. Lead Banks have been opened at the district level to promote agricultural development. Cooperative Banks, Land Development Banks and Nationalized Banks are also providing credit to the farmers on easy terms. Besides these, National Bank of Agriculture and Rural Development (NABARD) has been established to take care of the agricultural credit and to encourage rural and agricultural development. The institutions like Food Corporation of India, Indian Council of Agriculture Research (ICAR), Agricultural Universities on Demonstration of farms, Dairy Development Board etc. have been established. Agricultural Costs and Price Commission fixes the prices of various commodities by taking into account the cost of production so that the farmers do not have to sell their produce at low prices. Irrigation has also experienced significant development. The State governments provide chemical fertilizers and electricity to the farmers at subsidized rates. Punjab government has been providing free water and electricity to the farmers. In south India, Tamilnadu government is also following a similar strategy.

In spite of all this, due to some specific reasons, some farmers unions think that the government is not giving full attention and support to the agricultural sector. They object to the large differences found in the prices of produced in rural and urban sector. The security, which is provided to the agricultural society, is not at par with that which provided to the people working in the industrial and service sectors. Not only that, the prices of agricultural commodities keep on changing. Two-third of the work force of India contributes less than one-third to the national income. This fact needs a serious thinking. India is still an agrarian nation and society too is an agricultural society. This always involves a feeling of collective welfare. No solution can be expensive for the improvement of this kind of agriculture and agricultural society.

CROP SEASONS

In India, there are three major agricultural seasons of crops. These are the Rabi (winter), Kharif (summer), and the Zaid (intervening). The main reason of three seasons of crops in a year is the availability of tropical climate which facilitates the cultivation of crops throughout the year in most parts of the country. Agricultural activities commence with the onset of monsoon showers in the country. The farmers start ploughing the fields and after sowing the seed beds of paddy, they start waiting for rains. With the onset of rains in June and July, they sow their Kharif crops. In irrigated regions like Punjab and Haryana where the monsoons commence in July, the farmers plant paddy with the help of irrigation without waiting for rain. It ripens by the time the monsoon starts retreating. Rice, Jowar, Bajra, Maize, Groundnut, Jute and Cotton are the major Kharif crops. Pulses are also grown in this season. Some pulses like Arhar takes long time to ripen.



After this, the Rabi season starts. The Rabi crops depend on the moisture available in the soils. The crops of this season are sown in November and are harvested in April –May. But in the irrigated regions of commercial agriculture, like Punjab, Haryana, and western Uttar Pradesh, irrigation is used to maintain the soil moisture. The Indian agricultural scientists have also invented some varieties of wheat which mature within 100 days. Therefore, the wheat crop sown in December and first half of January get ready for harvesting by the middle of May. In addition to wheat, other major Rabi crops include Barley, Bengal gram, Mustard, Toria etc.

Besides these two major crop seasons, during the rainy season the farmers also grow vegetables, musk melon, water melon, bitter gourd, cucumber etc. in the khadar regions of the rivers. These are called 'zaid' crops. Nowadays a short cropping season is also seen in the irrigated areas, during which the fast growing crops such as Moong and Mash are grown. Such pulses are major sources of protein in our food.

India is such a vast country in terms of size that wide variations are found in weather from one part of the country to another. Due to this diversity, almost all the cereals, pulses, fruits, vegetables, fibrous crops, etc. grown in the world can be cultivated here. In the following pages we will describe some major food crops, oilseeds, beverages, and fiber crops.

FOOD CROPS

Paddy (Rice):

This is the most important food crop of the country. India ranks second in the world in the production of paddy, after China. In 1997 –98, the food crops occupied a total area of 12.27 crore hectares out of which, 4.34 crore hectares or 34.7% of the total crop land was under rice. It is the staple food in most states of the country. In all those areas where rainfall is above 100cm rice is the staple food. In this way, 100 cm of isohyte makes the limit of the rice region of the country. This region includes the east and west coastal plains; deltaic regions; lower hills and plains of northeastern India; Himalayan foothills of west Bengal, Bihar, Eastern Uttar Pradesh; eastern Madhya Pradesh; Chhattisgarh; northern Andhra Pradesh and Orissa.

In fact, paddy is a tropical monsoon plant. Therefore, it thrives well in the hot and humid climate. Thus, it is especially produced in Kharif (summer)season. Rice needs more than 25^o C of temperature and more than 100 cm of rainfall. With the help of irrigation facilities, paddy (rice) is also cultivated in low rainfall areas such as Uttaranchal, western Uttar Pradesh, Haryana, Punjab and some districts of Rajasthan adjoining Punjab –Haryana.

The areas under paddy has been continuously increasing in the country. In 1950 –51, paddy was sown on only 8 crore hectares of land and has increased to cover 4.34 crore hectares in 1997 –98. This means that area, under paddy



has increased to about 42% during the last 47 years. In other words, rice area has grown at the rate of 1% per annum. Similarly, the production of paddy has also increased tremendously. During the same period, the production increased from only 2.5 crore tons to 8.2 crore tons. The large increase has mainly been due to the increase in the yield per hectare of paddy. The yield has increased from 6.7 quintals per hectare in 1950-51 to 18.9 quintals per hectare in 1997-98. In this way, the yield has increased about three times which rose to be 35 quintals per hectare by 2020-21.

West Bengal is the largest producer of Paddy in India. The state produced 1.21 crore tons of paddy in 1997-98. The per hectare yield of paddy is 1998 kg. West Bengal is followed by Uttar Pradesh, Andhra Pradesh, Tamilnadu, Bihar, Punjab and Orissa and each of these states produces more than 60 lakh tons of rice. In eastern Uttar Pradesh, the yield of paddy was 1867 kg. However, Punjab ranks first in terms of paddy yield which is 3132 kg per hectare. Besides these areas, large amount of paddy is produced in Madhya Pradesh, Assam, Karnataka, Maharashtra and Haryana. The production is also very high in the deltas of Krishna, Cauvery, Godavari and Mahanadi rivers, due to good rainfall and irrigation facilities. In these areas two to three crops of paddy are taken in a year because of high temperatures and high rainfall conditions for most part of the year. In West Bengal, three crops of rice are grown and these are known as Aman, Boro and Aus.

In Punjab and Haryana, the climate is dry but rice is cultivated commercially in these regions by using available irrigation facilities. In these states, rice is not the staple food of the people but good quality of 'Basmati' rice is produced, which is even, exported to foreign countries, besides other parts of the country. On the other hand, in states like West Bengal, Uttar Pradesh, Andhra Pradesh and Orissa, rice has to be imported from Punjab and Haryana in spite of large production but huge domestic consumption. Government agencies like Food Corporation of India buys most of the rice from states like Punjab and Haryana for the Public Distribution System. For example, 54.9 lakh tons of rice was bought for central pool from Punjab in 1993-94 which was nearly 72% of the total rice produced in Punjab during that year and it was 40.2% of the central pool. In this way, Punjab contributes 4 quintals in every 10 quintals of rice to the central pool. In Punjab, the yield per hectare of rice is very high. For example, in West Bengal which is the largest producer of rice, the yield per hectare was 1998 kg in 1997-98 while this was 3132 kg in Punjab. In 2020-21, yield per hectare rose to 6785 kg.

Rice is also cultivated in the northern hilly regions, from Kashmir to Assam, by making terraced fields. The production of rice in the country has largely increased with the use of high yielding varieties, fertilizers and better technology. The agricultural exports have increased with the implementation of new economic policy of the Indian government favouring increase in exports of agricultural products. Indian paddy is rapidly becoming famous in the world market. This is considered as a great opportunity for earning foreign currency.

By encouraging exports, new opportunities can arise in increasing the production in the agricultural sector and employment sector.

Wheat

Wheat is the second major food crop of the country. India ranks 5th in the production of wheat in the world. It produces 9% of the total production of wheat in the world. In 1997 –98, the production of wheat in the country was 5.59 crore tons which was 74% of the total rice produced during that year. However, the difference in the area under these two crops is very large. The area of wheat had risen to 3.39 crore hectare in 2014-15 which was 2.67 crore hectares, and that of paddy was 4.34 crore hectares in 1997-98. This wheat area formed 59% of the total paddy area. That means, wheat was cultivated on 59% of the total area under paddy but from this area the wheat produced constituted 74% of the total production of paddy. This clearly reveals that the per hectare yield of wheat is very much higher than the yield of paddy. The per hectare yield of wheat was 24.70 quintals in 1997 –98 as compared to only 18.93 quintals for paddy. In this way, the yield of paddy was 21% less than the yield of wheat.

Phenomenal change has taken place in wheat production during the post-Green Revolution years. The green revolution in India was implemented in the year 1966 –67. In 1960-61, the production of wheat was 1.10 crore tons which increased to 2.38 crore tons in 1970 –71 and further increased to 6.94 crore tons in 1996 –97. No other crop has recorded such a high increase in production after the green revolution. While wheat has experienced about five times increase during 1960 –61 to 1996 –97, rice on the other hand could increase by less than two and a half times in terms of total production. Perhaps it is because of the tremendous increase in the production of wheat that many people often regard the ‘green revolution’ as the ‘wheat revolution’. Wheat production of Punjab in 2019-20 has been 17.616 thousand metric tons.

The wheat and rice producing areas are quite different. Whereas on one hand, the major production regions of paddy are, coastal plains of eastern and western India, the major wheat growing region on the other hand are north and northwestern India. Here wheat is mainly grown in Punjab, Haryana, western Uttar Pradesh, districts of Rajasthan adjoining Punjab and Haryana and Madhya Pradesh. Besides these, wheat is also produced in Bihar, Gujarat and Maharashtra.

Uttar Pradesh is the largest wheat producing state in the country. It produced more than 2.22 crore tons of wheat in 1996 –97. It is followed by Punjab and Haryana in the second and third place respectively. After these come the states of Madhya Pradesh, Rajasthan and Bihar. These six states together produce 94% of the total wheat of the country. The production of Uttar Pradesh, Punjab and Haryana is nearly 70%. In this way, wheat is highly concentrated in these three states of the country as compared to paddy which is more wide spread.

However, in terms of production, Punjab is although ranked second in the country but it occupies first place in yield per hectare of wheat and contribution to the central pool. The yield per hectare of wheat in Punjab is 38.77 quintals whereas the national average is 24.7 quintals. The cultivation of wheat in Punjab is done on a large scale. Farmers here grow wheat as a commercial crop. In 1996 -97, Punjab contributed 64.9 lakh tons of wheat to the central pool which is more than half (50.6%) of the total wheat procured in the country. Therefore, more than half of the wheat sent to the central pool for Public Distribution System is contributed by the Punjab farmers. This is a very important contribution of the farmers of Punjab to the national service.

At the time of sowing, wheat requires cold and moist climate and at the time of ripening, warm and dry climate is needed. Between 50 to 75 cm of rainfall is favourable for this crop. Therefore, Rabi season is best for the wheat crop.

Rain showers during winter season and availability of adequate irrigation facilities are highly beneficial for growing wheat. Sometimes winter cyclones coming from the Mediterranean sea bring very good rainfall in northwestern India. This rainfall proves very useful for the wheat crop. But sometimes, large damage also occurs due to hailstorm and heavy fog or ground frost. The farmers of Punjab, Haryana and Uttaranchal, western Uttar Pradesh have assured irrigation through tubewells. As a result, good crop of wheat is generally obtained. In a way, farmers of these parts, have to a large extent removed the large variations caused by Indian monsoons by acquiring high yields of wheat with the help of irrigation. However, the same is not true for the paddy regions. Most of the paddy crop in the country, even today depends on the monsoons.

Millets

Jowar, Bajra, Goara, Maize, etc. are the millets which are sown in the Kharif season. Jowar and Bajra are mainly produced in the arid parts. Bajra is mostly sown in the rain shadow regions of Maharashtra, Madhya Pradesh, Karnataka and Gujarat and in those dry regions of Rajasthan which receive low rainfall. Besides these, it is also grown in Jhansi, Jaloun, Hamirpur and Banda districts of southwestern Uttar Pradesh. Jowar is mainly grown in Karnataka, Andhra Pradesh, Maharashtra and Madhya Pradesh.

In Punjab, millets like Jowar, Bajra and Goara were grown earlier. But with the development of irrigation facilities, farmers of Punjab have adopted the highly productive crops like wheat and rice in place of low productive crops like millets. Therefore, a sharp decline is noticed in the cropped area under crops like Bajra, in last few decades. In 1960 -61, the cropped area under Bajra in Punjab was 1.23 lakh hectares which declined to only 9000 hectares in 1994 -95. In this way, about 1400% decline has been recorded in the area under Bajra. Similarly, the area under Jowar has also decreased from 6000 hectares to 500 hectares during this period. The area under Bajra and Jowar has also declined in the whole country. Jowar occupied 1.84 crore hectares

in 1960 –61 which declined to 1.15 crore hectares in 1994 –95. Area under Bajra has also decreased from 1.15 crore hectares to 94 lakh hectares during this period. The yield per hectare of Bajra and Jowar respectively was 700 and 779 kg in 1994 –95.

Maize which is actually an American crop, was sown on an area of 61 lakh hectares in 1994 –95. However, its area was only 44 lakh hectares in 1960-61. Although area under maize has slightly increased during the last 34 years, but its cultivation is limited to only few areas. For example in a progressive state like Punjab, a large decline has been noted in maize area. Here in 1960-61, Maize was sown on 3.27 lakh hectares of land and declined to 1.73 lakh hectares in 1994 –95. Due to decline in area under maize, in Punjab, the production has declined. However, the decline in production has been very slow. This is due to the increase in the yield per hectare. The yield per hectare of maize in Punjab was 11.3 quintals in 1960 –61 which increased to 18.6 quintals per hectare in 1994 –95. Similarly, the per hectare yield of maize increased in the country as a whole to 15.7 quintals during the same period. Although the yield per hectare of maize has increased considerably but this increase has been very low as compared to rice and wheat. Secondly, the yield per hectare of maize has increased in most other parts of the country except Punjab. But the situation gets totally reversed in case of yield of wheat and rice. The yield per hectare of these two crops is very high in Punjab as compared to other parts of the country. Maize or corn production was 410 thousand metric tons in 2019-20.

Pulses

India is the largest producer and consumer of pulses. Pulses are the major source of protein for a majority of people. Most of the people are poor and are vegetarians. Pulses are cheap as compared to meat and are major source of protein for the vegetarian people. Gram, Arhar, Moong, Mash, Massar and peas are considered as the major pulses. Except the heavy rainfall areas, pulses are grown in all parts of the country. Moong, Mash and Massar are produced in the Kharif as well as in Rabi seasons. All pulses help in increasing the fertility of soil. Generally, pulses are mixed with other crops. The farmers of western Uttar Pradesh grow early maturing varieties of Moong, Mash and Massar, mixed with sugarcane.

The area under pulses has decreased in the country. The main reason is the area under pulses is being shifted to the more profitable crops like rice and wheat after the green revolution. The pulses were sown on 2.60 crore hectares of area in 1960 –61 which decreased to 2.30 crore hectares in 1994 –95. In this way, the area under pulses has recorded a decline of 30 lakh hectares in the last 34 years. The production of pulses has increased slightly. During the same period, the yield per hectare of pulses has increased from 5.39 quintals to 6.10 quintals. However, the major cause of concern is that the per head consumption of pulses has declined to about half. In the year 1955, the per capita consumption of pulses was 71.1 gms which has decreased to 37.2 gm in 1994.

The situation in Punjab is still more serious. Here, the rotation of wheat and rice has eliminated nearly all other crops. In 1960–61, pulses were cultivated on 9.3 lakh hectares of land in Punjab. This declined to only 95000 hectares in 1997–98. With this, the per capita consumption of pulses has also recorded a great decline, from 175 gm per day in 1960–61 to only 10 gm per day in 1997–98. Such a sharp decline in the consumption of pulses is a serious matter not only in Punjab but in other parts of the country also. This has happened because of the fact that the green revolution has brought a revolutionary increase in the production of rice and wheat. The pulses have not been able to help in increasing the production of crops. In the post - green revolution years, a large part of area under pulses has been diverted towards more productive crops like wheat and rice. This has especially happened on a large scale in the states like Punjab where commercial agriculture is predominant.

Our government however, has certainly paid some attention in the past few years to increase production of pulses. But stringent measures are needed for developing new, high yielding varieties of seeds of pulses. In the past few years, there has been some increase in the early maturing rabi crops of Moong, Mash and Moth. In the total production of pulses, the share of rabi pulses was double as compared to the kharif crops in 1994–95. At this time, the production of rabi pulses was 94 lakh tons whereas it was 47 lakh tons in case of kharif pulses. India produced 25 crore tons of pulses in 2020-21.

In the following table, the data regarding the production of food crops have been given. Analyse these figures in your class. In which period the increase in the production of food grains was the maximum? When was the increase in production of wheat was maximum during this period? What does the comparative analysis of increase in the production of rice and wheat indicate? In which period the pulses recorded maximum increase? Try to find answers to these questions.

Table 6.4: Average Annual Increase in the India's Foodgrain Production (percentage)

Time Period	Rice	Wheat	Pulses	Total Foodgrains
Average combined growth rate				
1967–68 to 1995–96	2.90	4.72	0.93	2.67
1980–81 to 1995–96	3.35	3.62	1.21	2.86
1990–91 to 1996–97	1.52	3.62	1.07	1.70

Note: To measure the growth rate the triennium ending 1981-82 has been taken as the base.

FOOD BUDGET OF INDIA

The food needs of any country are determined by the size of population and its standard of living. If the population is growing rapidly, then larger amount of food is required. But with the rise in standard of living, the food habits of human beings also experience a change. With this, the use of foodgrains starts decreasing and that of eggs, milk, meat and fruits starts increasing. Also, the amount of cereals in food of villagers is more than the urban people. Therefore, if the proportion of urban population is higher then the consumption of foodgrains will be less as compared to the consumption of other products.

As per 2001 census, the total population of India is 102.7 crores. This population is three times the total population of the country at the time of independence. The doubling period of the population in the country is 35 years. The growth rate has however experienced a slight decline during the last decade. Even then the population is expected to reach 150 crore by the middle of 21st century. At the end of 21st century, the population of India will be between 160 to 170 crores.

For such a large population, we require about 40 crore tons of foodgrains. Currently, the production is 9 crore tons. In this way, we need to increase the production by a large amount. At the same time, there is very little scope of increase in the net sown area, since the use of land for non –agricultural purposes is increasing. Therefore, we can increase production by increasing multiple cropping and by using more and more of modern technology. Between 1990–91 to 1996-97, the production of foodgrains increased at the rate of 1.7 per cent per annum while the population increased by 1.9%. This is a matter of great concern. If the production of foodgrains declines slightly even between 3 – 4%, we will have to import large amount of foodgrains. The second important thing is that our requirement of foodgrains is demand based rather than need based. In other words, a section of population of the country is such that needs foodgrains, but due to the lack of purchasing power, is not able to get these. In this way, many people of the country do not get food to eat inspite of availability of foodgrains. If we make an estimate of this hidden demand then we would come to know that the country requires much more foodgrains.

There are some serious problems of agriculture of the country which need earnest attention. Among these, three are major problems. First, the decreasing public-sector investment in agriculture and less utilization of agricultural infrastructure in the present agriculture. The second problem is related to the production of new varieties of high yielding seeds. The progress in this sector is almost nil. For the past few years, research on developing new seeds has been going on at snail's pace. Development of such seeds for pulses, oil seeds, vegetables and fruits is very strongly needed. Third important problem is related with the very low growth rate in the agricultural sector and the diversification of cropping pattern. We have to increase the reforms in the

agricultural sector similar to the industrial sector because reforms in these two sectors cannot be separated. All these things have to be kept in mind to fulfill the increasing demand of foodgrains and for increasing the pace of development of agriculture.

COMMERCIAL CROPS

These are also called cash crops. These include mainly sugarcane, oilseeds, cotton, jute, rubber, wool and tobacco. Among these, jute, cotton and wool are also called the fibre crops. In the following pages, a detailed description of sugarcane, oilseeds and cotton is given.

Sugarcane

Sugar makes a chief component of our daily diet. In villages, people are very fond of eating rawsugar (*Gur*) and jaggery. Naturally, sugarcane is indigenous to India and in terms of production, India occupies fifth place in the world. Although, sugarcane is grown in many parts of the country, the major sugarcane producing states are Uttar Pradesh, Maharashtra, Punjab, Andhra Pradesh, Tamilnadu, Karnataka, Gujarat, Haryana and Bihar. Among these, Bihar produced the lowest 44 lakh tons while Uttar Pradesh was the largest producer with 10.5 crore tons of sugarcane in 1993 -94. During this period, a total of 22.7 crore tons of sugarcane was produced in the country.

In 1960 -61, sugarcane covered 24 lakh hectares of area in the country. This area increased to 40 lakh hectares in 1997 -98. During this period, the production also increased from 11 crore tons to 27.63 crore tons. Similarly, the yield per hectare also increased from 46 quintals to 70 quintals. Fast changes keep on taking place in the sown area, production and yield per hectare of sugarcane. This happens due to the fluctuations in the market price of sugar, damage to sugarcane crop because of diseases and effect of bad weather on yield per hectare.

In Punjab, the area under sugarcane was 1.50 lakh hectares (estimated) in 1995 -96. In the previous year 1994-95 this area was only 80 thousand hectares. The area under sugarcane has experienced considerable changes in the state during the past 35 years. The crop occupied 1.33 lakh hectares of area in 1960 -61. It declined to only 71 thousand hectares in 1980 -81. After this also its area has been experiencing many changes. Similar changes have also occurred in the yield per hectare. The production of sugarcane was about 9.2 lakh tons in 1995 -96 whereas this production previously was only 4.95 lakh tons in 1994 -95. In 1960 -61, total production was 4.86 lakh tons. Whereas Sugarcane production was 73 lakh metric tons in 2019-20. Sugarcane has suffered greatly both in terms of production and area due to the rapid changes that have taken place in the crop pattern. In 1970s and 1980s, the farmers adopted the wheat -rice crop rotation in place of other crops. The Punjab government is now trying to break this crop rotation. It is encouraging the farmers to grow sugarcane. The farmers are offered higher per quintal price of sugarcane than

in many northern states, so that they get attracted towards its cultivation. The rapid increase in the area under its cultivation in 1995 –96 as compared to the previous year is the result of these efforts. The government is also trying to find other solutions to expand the cultivation of sugarcane in the state.

Sugarcane requires well-drained fertile soil. It also needs large amount of chemical fertilizers and organic manure. Hot and humid climate is favourable for its higher yields. It grows well in areas with about 100 cm of rainfall. Infact, good crop of sugarcane is procured in the irrigated regions with adequate sunshine. As it is a tropical plant, the climate of the state of Tamilnadu is best suited for its cultivation. The yield per hectare of sugarcane in this state is 40 per cent higher than the national average.

Oilseeds

Edible oils are obtained from various oilseeds such as groundnut, mustard, toria, sunflower, cottonseed, coconut, etc. As you know, the edible oils are essential part of our food. Almost all vegetables and other food products are cooked in these edible oils. Groundnut is a major oil seed and is a kharif crop which depends on the normal but timely rainfall. Sarson (mustard) and toria are rabi oilseeds and are grown in both irrigated and unirrigated areas. Fluctuations in the yield per hectare, total production and the market prices have a chief feature of these crops.

Mustard and toria are mainly grown in wheat growing regions of north and central India like Punjab, Haryana, Uttar Pradesh, Rajasthan and Madhya Pradesh. Groundnut is mainly cultivated in the western and southern India especially in Gujarat and Maharashtra.

The demand of edible oils is rapidly increasing in the country. Since it is not fulfilled through domestic production, therefore, large quantity of edible oils is imported. The demand of edible oils is increasing by 5% per annum and the growth rate of population is 2% per annum. Try to discuss the reasons of this difference in your class. Groundnut and mustard together constitute nearly 60% of the total oil seed production of the country. Nowadays, the producing area of soyabean and sunflower is increasing.

Different crops of oilseeds in the country occupied 2.63 crore hectares of land in 1997 –98. Earlier, oilseeds were grown on total of 1.38 crore hectares of land in 1960 –61. In 1980 –90 decade, the production area of oilseeds in the country has increased from 1.76 crore hectares to 41 lakh hectares. An astounding increase in the production has been noticed during this decade (1980 –90). The total production was 94 lakh tons in 1980 –81 which increased to 1.86 crore tons in 1990 –91. Earlier in 1960 –61, the production was only 70 lakh tons which increased to 2.20 crore tons in 1997 –98.

In contrast to this, Punjab has experienced decline in the area under oilseeds. The area under oilseeds, which was the highest with 3.15 lakh hectares in 1975 –76 reached the lowest mark with 1.4 lakh hectares in 1990 –91.

However, the area has increased marginally after that but on the whole the area has remained almost static. In 1994 –95, total production area was 1.48 lakh hectares. In 1995 –96, the area was 2.70 lakh hectares. Large changes have occurred in the production also. The total oilseed production was 2.63 lakh tons in 1975 –76. In 1990 –91, the production declined to the lowest level with 93 thousand tons. In the year 1994 –95, the production was 1.85 lakh tons while the production in 1995 –96 was 3.26 lakh tons. Punjab produced 5.9 lakh metric tons of oilseeds in 2019-20.

Madhya Pradesh holds the top position in oil seed production in the country. In this state 45.77 lakh tons of oilseeds was produced in 1993-94. Maharashtra is ranked second with 23.46 lakh tons of oilseed production. After this, comes Karnataka which produced 19.40 lakh tons followed by Gujarat with 15.72 lakh tons. These four states together account for nearly half of the total oilseeds production in the country. India produced 3.42 crore metric tons of oil seeds in 2019-20.

Cotton

Cotton plant is indigenous to India. Evidence exists of cotton being cultivated even during the time of the Indus valley civilization. During that period, people used to spin yarn and weave cloth and then it was exported to the middle east Asian countries. In that period, this cotton was called as '*Sindhu*' by the Babylonians and '*Sindo*' by the Greeks.

Cotton is mainly grown in the Deccan plateau black soil areas of the country. Gujarat and Maharashtra are the main cotton producing states. Besides these, other major states producing cotton are Andhra Pradesh, Punjab, Haryana, Rajasthan, Karnataka, Madhya Pradesh and Tamilnadu. All these states together contribute 99.5% to the total production of cotton in the country. Maharashtra produces the highest, 26.25 lakh bales of cotton. Then comes, Gujarat in the second place producing 16.23 lakh and Punjab is ranked third producing 15.15 lakh bales of cotton. Andhra Pradesh and Haryana are ranked fourth and fifth and produce 13.40 lakh and 11.24 lakh bales of cotton respectively. All these figures are for the year 1993 –94, when these five states together produced about 77% or more than three-fourths of the total cotton production of India.

In 1997 –98, cotton was cultivated on 89 lakh hectares of land. During this year, 1.11 lakh bales of cotton were produced. Before this, in the year 1985 –86, the area under cotton was 75 lakh hectares and the production was 30 lakh bales. Previously in 1960 –61, the net sown area was 70 lakh hectares and 56 lakh bales of cotton were produced. In 1960 –61, the yield per hectare of cotton had increased from 125 kg to 249 kg. India produced 390 lakh bales of cotton in 2019-20.

In Punjab, there has been a notable increase in both the area and production of cotton during the past few decades. Cotton covered 4.47 lakh hectares of area in 1960 –61 which increased to 7.2 lakh hectares in 1992 –93. In

1993 –94 this area was 5.77 lakh hectares. Similar increase has also been noticed in the production. In 1960 –61 the production was only 7 lakh bales but in 1993 –94 it became 15.16 lakh bales. It is clear from these figures that large changes continue to take place in the production of cotton. Why is it so? Is it due to the crop: diseases ? Or is it because of some natural reasons? Is it due to wide fluctuations in market price of cotton or is there any other reason? Otherwise, Punjab produced 6.5 lakh bales of cotton in 2019-20.

Potatoes

Potato was brought to India in the 16th century by the Portuguese. Today it has become an important local vegetable. Uttar Pradesh, West Bengal, Bihar and Punjab are its major producers. In 1993-94 it was cultivated on 10.80 lakh hectares of land and more than 1.80 crore tons of potatoes was produced. Out of this more than 85% or 1.52 crore tons was contributed by these four states. In our country, a very good quality of potato seed is produced in Lahaul and Spiti valley of Himachal Pradesh which is considered free of diseases.

The farmers of Punjab have also shown interest in the cultivation of potatoes. Since 1960 –61, the area under potatoes in Punjab has been increasing continuously. In 1960 –61 this area was only 9 thousand hectares which increased to 30 thousand hectares in 1994 –95. Similarly, the production has also increased from 1.29 lakh to 6.03 lakh tons. The farmers of Punjab are also producing good quality and cheaper seed potatoes as compared to the farmers of Himachal. The demand for potatoes produced in Punjab has been increasing for the last few years. Potatoes are mainly grown in Jalandhar, Hoshiarpur, Patiala and Ludhiana districts of Punjab.

ANIMAL HUSBANDRY

In India, the farms, farmer and his animals, combine together to make an agricultural system. Animals, are really the true friends of the farmers. In the last few years, animal husbandry has proved very beneficial for the small farmers and workers. Animals have become source of employment and supplementary income for a large majority of the people of villages and small towns especially drought prone, hilly and other backward areas. According to the National Sample Survey (NSS) of 1987 –88, the growth rate of employment in the animal husbandry sector was 4.15% during 1972 and 1988 whereas the growth rate of employment in the agricultural sector as a whole was only 1.1%.

In the last few years, large increase in the number of milch cattle is an indicator of the development of dairy farming. Dairy farming has developed especially in the Punjab, Haryana and Rajasthan. It is estimated that more than one –fourth of the income from agricultural sector comes from the animal husbandry sector. Besides providing milk and manure to the farmers, cow also provides bullocks for the working in the fields. Because of this important utility, cow is considered as a mother in India and is even worshipped by the

people. In domestic animals about one-fourth or 24% are bullocks and three-fourth or 76% are cows.

In the country, Uttar Pradesh has the largest (611 crores) cattle wealth. Other states having large cattle wealth are West Bengal, Madhya Pradesh, Bihar, Rajasthan, Maharashtra and Andhra Pradesh. These seven states together account for 68.3% or more than two-thirds of the cattle of the country. Punjab occupying the 13th rank in the country, has a 96.7 lakh of cattle heads. While in terms of human population, it occupies the 14th place.

Large cattle wealth is found in India. The number of animals was about 53.58 crores in 2019-20. It included about 20 crore cows about 11 crore buffaloes, nearly 7.5 crore sheep, 14.9 crore goats and remaining was the number of horses, camels, pigs and mules etc.

Horticulture

India ranks second in the world in the production of fruits and vegetables. Brazil and China both are the largest producers of fruits and vegetables in the world. In our country, the production of fruits and vegetables has reached about 3.9 crore tons and 6.5 crore tons respectively. Fruit production has been more than 32 crore tons in 2019-20.

Our country has various types of agro-climatic conditions. Therefore, it is possible to grow a large variety of horticultural crops, which include fruits, vegetables, flowers, spices and orchard crops. Many types of horticulture crops are grown in India. These range from tea and coffee in the high hilly parts to coconut in the coastal areas of India. Therefore, it is clear that there exist immense potentialities for growing different types of horticultural crops in the country.

India ranks first in the world in terms of production of banana, mango, coconut and cashewnut. Besides this, India is one of the ten largest producers of mosambi, apple, kinnow, pears, etc. It is also amongst the ten large producers of potato, tomato, onion and peas, while in the production of cauliflower, it again occupies first place in the world. Horticultural products such as fruits, vegetables, flowers, cashewnuts, spices, etc. comprise nearly 25% of the total agricultural exports.

The production of flowers has been encouraged in the country during recent years. This is mainly because of the growing demand of flowers in foreign countries. Flowers have a huge foreign demand. In 1994-95, India exported flowers worth Rs.30 crores. To increase the export further, 200 export-oriented units have been recognised. In the eighth five year plan Rs. 250 crores were allocated for the development of green houses, drip irrigation etc.

In apple production, Jammu & Kashmir and Himachal Pradesh top the list. Maharashtra leads in production of oranges and bananas; Andhra Pradesh, Tamilnadu and Maharashtra lead in mango; while Tamilnadu, Karnataka and

Kerala are the major producers of cashewnut. In our own state, Punjab, the production of fruits has increased in recent years.

In the year 1995 –96, Punjab produced 7.6 lakh tons of fruits while in 1985 –86, this production was only 4.3 lakh tons. Hoshiarpur, Ferozepur, Amritsar and Faridkot are the chief fruits growing districts in Punjab. Fruit farming is gaining importance. This can be seen from the fact that in 1981-82, fruits were cultivated on only 28.8 thousand hectares of land in the state. By 1995 –96, this area reached 84.4 thousand hectares. Kinnow orchards occupy the maximum area i.e. 26.6 thousand hectares. Kinnow is followed by oranges and malta.

Forests

Forests play a very major role in maintaining the ecological balance. . Forests are an economic resource. These provide us timber and fuel wood. The teak forests of the monsoon regions provide valuable timber for construction purposes. These deciduous forests extend from mountains of western ghats in the south to the Himalayas in the north. Sal is the second most important and useful tree found in these forests. The area of sal forests is comparatively more than the area of teak forests. The malta (sweet orange) tree is however, found largely in eastern India.

In high rainfall regions of India Bamboo, Mahogany and Rosewood trees are found. These extend over the states of Kerala and Assam. In the Sunderban region, Sundri trees of mangrove species are found and their wood is used for making boats and boxes.

Softwood obtained from coniferous forests of Himalayas is used for making furniture, packing boxes and fixtures for buildings. Wood pulp is also made from soft wood which has a very high demand in the paper industry.

Besides timber, forests also provide lac, resins, gums, coal fuelwood, herbs, fodder and grasses. These days, social forestry is being promoted on planned lines in the country. Its main objective is to bring barren lands under forests, to provide employment opportunities to the rural people and to solve the problem of fuelwood in the villages.

Exercises

I. Answer the following questions objectively :

1. Name the crops which are sown in Kharif Season.
2. Which are the crops sown in Rabi Season.
3. What is difference between Green Manure and Fertilizer.
4. What are milch cattle?
5. What is fallow land?

6. What is the percentage area of our country under forests?
7. How much area should be under the forests from the scientific point of view?
8. How much percentage area in Punjab is under forests?
9. How much percent of land is under agriculture in India?
10. Which is the largest wheat producing state of our country?
11. Which state of our country contributes largest amount of wheat to central pool?
12. What are the causes of decreasing pasture lands?
13. How much more percentage area should be under forests?
14. What is the rank of Punjab in terms of per hectare production of wheat?
15. What is the rank of India in terms of producing pulses in world?
16. After the green revolution, what type of change occurred in production of pulses in Punjab.
17. At the end of 21st century, how much foodgrain required for the Indian population.
18. Write down any three problems of nowadays of Indian agriculture.
19. What is the rank of India in world in production of sugarcane?
20. Name the crops of oil-seeds.
21. Name any two states those produce maximum amount of ground- nuts.
22. In which decade the area under oil seeds production has increased the most.
23. Which are the main cotton producing states of our country?
24. What is the per hectare production of cotton in our country?
25. Which are the main potato producing states of India?
26. Name the potato producing districts of Punjab.
27. What is the rank of Punjab in country in respect of cattle wealth?
28. Which part of the country amounts the highest cattle wealth?
29. What is the rank of India in world in respect of fruits and vegetables?
30. Name the apple producing states.

II. Answer the following questions in short :

1. Why is agriculture known as basic main stay of economic system?
2. What are the main features of Green Revolution?
3. Which items are included in Agriculture side?
4. What is the difference between Milch cattle and working load animals?
5. What is the difference between current Fallow Land and old Fallow Land?
6. What climatic conditions are required for the wheat cultivation?
7. Name the main paddy growing areas of our country.
8. Discuss the required condition for the production of Sugar Cane.
9. What are main uses of Forests?

10. Why a Indian agriculture is known as subsistence agriculture?
11. Why some people call green revolution as wheat revolution?
12. Explain the efforts made to the development of Animal wealth.
13. What are reasons that are responsible for the increase in land use under non-agricultural uses?
14. Write in brief about the importance of forests.
15. What effect incurred after independence on the requirement of foodgrains per head?
16. What are the reasons of small land holdings in India, how these affect Indian agriculture?
17. Name the main paddy producing states.
18. What are the causes of high per acre yield of wheat in Punjab?
19. What are the causes of decrease in area under pulse cultivation?
20. Write down the benefits of Dairying Industry.
21. Why productions of pulses and oil seed is still low?
22. What are main problems of Indian Agriculture?
23. Explain the changes that have been occurred rapidly in the diversification of crop rotation after Green Revolution.
24. What are the indications that depict that Indian agriculture is advancing towards commercial agriculture leaving behind the subsistence type of agriculture?
25. What efforts have been made by Government of India for the development of Agriculture?

III. Answer the following questions subjectively :

1. Explain in detail the problems being faced by the Indian Agriculture.
2. Write an explanatory essay on Green Revolution of India.
3. Explain in details about the cultivation of paddy in India.
4. Explain in detail about the cultivation of wheat in India.
5. Write about the cultivation of pulses in India.
6. Highlight the causes that lead the decrease in area under oil-seed after the Green Revolution and what steps have been taken by the government to increase the cultivation of oil-seeds.
7. Write an comprehensive essay on the cotton production in our country,
8. Explain the main features of Horticulture in India.

IV. Show the following on the map of India.

1. Main wheat producing areas.
2. Main Jawar Bajara producing areas.
3. Main cotton producing areas.

4. Main Rice (paddy) producing areas.
5. Main oil seeds producing areas.
6. Sugar cane producing areas.
7. Main pulses producing states.
8. Maize producing areas.

CHAPTER 6

MINERALS AND POWER RESOURCES

A large number of valuable mineral resources are hidden in the womb of mother earth. Some of them are hidden deep under the ocean floor. These mineral resources are of great importance in the present day economic development of nations of the world. The base of economic and industrial power of England - the creator of industrial development in the modern period has been the easy availability of the minerals like iron, coal, gold, copper, aluminium, etc.

India is also considered sufficiently rich in mineral wealth. According to an estimate, India has one –fourth of the total iron ore reserves in the world. Our country has largest reserves of manganese, which is mainly used in the iron and steel industry. Many reserves of coal, limestone, bauxite and mica also are present in India. But non–ferrous minerals like lead, zinc, copper and gold are found in very small quantities. Sulphur reserves are almost nil in the country, although sulphur is the chief base of modern chemical industry.

In our country, water power and nuclear power resources, are also found in large quantities. Their use is growing very rapidly because of their vast power potentiality and their environment friendly nature. That is why solar energy is also being used as a power resource. Solar energy is the invaluable energy resource provided by nature. Its use will increase more rapidly as a future power resource.

According to the Indian constitution, the utilization of minerals and the framing of laws related to these resources is a state subject. But central government makes laws for gearing the development of minerals under the Mines and Mineral Industry Act, 1957. According to this act, the government of India reserves the following rights:

- (i) To issue licence for extracting all minerals and give mining contracts, except for minor minerals.
- (ii) Development and Conservation of minerals and
- (iii) To renew and rotate the old mining contracts after sometime. This act was implemented on 1st June, 1958 and many amendments have been in it in 1972 and 1986. The major mineral resources of India are being described below:

1. IRON ORE

The best quality haematite and magnetite iron ores are found in India. These contain of 60 –70% of the iron content. Haematite ore is mainly found in Bihar, Jharkhand, Orissa, Madhya Pradesh, Chhattisgarh, Maharashtra, Goa



and Karnataka whereas magnetite ore is mainly found in Maharashtra and Karnataka along the western coast. Besides these, iron ore is also found in Kerala, Tamilnadu and Andhra Pradesh.

According to an estimate, the total reserves of useful iron ore in the country are 12.74 billion tons. Of which haematite consists of 9.600 billion tons and magnetite consists of 3.14 billion tons. More than 50% of iron ore in India is found in Bihar, Singhbhum district of Jharkhand and surrounding Keonjhar, Bonai and Mayurbhanj districts of Orissa. Besides these, iron ore is also found in Hazaribagh, Palamau and Sahibganj districts of Orissa.

Iron ore is also present in Raipur, Durg, Rajnand Gaon, Bastar, Raigarh, Bilaspur districts of Chhattisgarh and Balaghat and Jabalpur districts of Madhya Pradesh. The iron ore found in the Bailadila region, is famous for high production and export. Bellary, Chitradurga and Chikmagalur districts of Karnataka are also major centres of iron ore. Kudremukh mine of Karnataka is very famous for export of iron ore.

The production of iron ore in the country is continuously increasing. In 1951, the production was only 4 million tons which increased to 50 million tons in 1987 and reached 71.5 million tons in 1997-98 and 21 crore tons in 2019. As a result of the government policy of increasing the public and private sector investment in mining industry, the production of iron ore has recorded a rapid increase in the past few years. Japan is the major importer of the iron ore of our country. Besides this, Iran had invested in the Kudremukh mines through which iron products were to be imported from India.

2. MANGANESE

It is used as a raw material in the manufacturing of steel. Its mixture is used for increasing the strength of steel. Our country has vast reserves of manganese. The total reserves are estimated to be around 950 million tons. Odisha state is the largest producer of this mineral. It is followed by Madhya Pradesh, Chhattisgarh, Maharashtra and Karnataka. States like Andhra Pradesh, Goa, Gujarat and Bihar also produce manganese.

The main centres of mining of manganese are: Keonjhar, Kalahandi, Mayurbhanj (Odisha); Balaghat, Chindawara, Jabalpur, Jhabua (Madhya Pradesh); Nagpur, Bhandara and Ratnagiri (Maharashtra); Panchmahal (Gujarat); Chitradurga, Tumkur, Shimoga, Chikmagalur, Belgaum, North Kanara and Dharwar (Karnataka). Besides these, some reserves are present in Singhbhum (Jharkhand); Vishakhapatnam, Nizamabad (Andhra Pradesh); Banaswara and Udaipur (Rajasthan).

India occupies fourth place in the world in the production of manganese ore, after Brazil, South Africa and former USSR. The total production of country was 1.8 million tons in 1996 -97. Before this, in 1991-92, total production was 1.55 million tons.

3. MICA

India is the largest producer of mica in the world. India alone exports 60% of the total world exports of mica. Among its main producing states are Jharkhand, Bihar, Andhra Pradesh and Rajasthan. Half of total mica is found in Bihar. Hazaribagh district in Jharkhand; Gaya and Monghyr (Bihar); Nellore (Andhra Pradesh); Ajmer, Tonk, Bhilwara and Jaipur (Rajasthan) are chief districts that produce mica. In 1991-92, the country produced nearly 34000 tons of mica which rose to 95 thousand tons in 2020. It is mostly used in the electrical industry. The country earns foreign currency worth about 150 crore rupees through its export.

4. BAUXITE (ALUMINIUM)

Bauxite is an ore of aluminium which is largely consumed by the electricity industry. Aluminium being a lighter metal and good conductor of electricity, is mostly used in aircraft and electric goods. India occupies fifth position in the world in the production of this ore. The total reserves of bauxite in India are estimated to be around 2.530 billion tons. The major states producing bauxite ore are Andhra Pradesh, Bihar, Jharkhand, Goa, Gujarat, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Chhattisgarh, Maharashtra, Odisha, Tamilnadu and Uttar Pradesh.

Palamau (Jharkhand), Khera (Gujarat), Jabalpur (Madhya Pradesh) have mines of good quality bauxite. Besides these, good quality bauxite is also found in Bilaspur and Bastar (Chhattisgarh), Balaghat (Madhya Pradesh), Salem (Tamilnadu), Chitradurga and Belgaum (Karnataka), Kolhapur (Maharashtra) and Jammu (Jammu & Kashmir).

In 1951, the total production of bauxite was 68 thousand tons which increased to 1.9 million tons in 1979 and 5.9 million tons in 1996 -97 while 230 million tons in 2019. India exports bauxite to Japan and European countries.

5. COPPER

Copper is used for making utensils for domestic use. Being a good conductor of electricity, it has proved very useful for the electrical industry. The main producing regions of Copper in India are: Singhbhum (Jharkhand), Balaghat (Madhya Pradesh), Jhunjhunu, Alwar (Rajasthan). Besides these, Copper is also extracted in small quantities from Khammam (Andhra Pradesh), Chitradurga, Hassan (Karnataka) and Sikkim. The total estimated production of copper ore in India is 2.86 billion tons. From this about 2.85 million tons of copper metal is estimated to be obtained. In 1997 -98, 4.496 million tons of copper ore was produced in the country which dropped to 3.35 lakh tons in 2020.

6. GOLD

This is very important and costly metal. It is used for the manufacture of jewellery, for keeping as reserves in banks and for meeting the deficit in balance of payments in foreign trade whenever the need arises.

Our country has very small reserves of gold. Gold is mainly extracted from **Kolar field mine** (Kolar district) and Hutti mines (Raichur district) of Karnataka. Besides this, gold is also extracted in small quantities from Ramgiri gold region of Anantpur district in Andhra Pradesh. Kolar mines are one of the deepest mines in the world, because of which the extraction from these mines is most costly in the world. Total gold ore reserves are estimated at 88 lakh tons. The production of gold is decreasing in the country. In 1951, India produced 7000 kg of gold, which decreased sharply to 2636 kg in 1979 and further to 1931 kg in 1986. However, the production has slightly increased to become 2032 kg in 1991-92 and 2700 kg in 1996 -97 and 757 metric tons in 2019.

7. LIMESTONE

Limestone is found in large quantities in our country. It is used in cement industry and for white washing of the houses. Though it is produced in almost all states but major production regions fall over Madhya Pradesh, Chhattisgarh, Tamilnadu, Andhra Pradesh, Gujarat, Jharkhand, Odisha, Rajasthan and Karnataka. The total limestone reserves in India are estimated at 76.450 million tons. In 1996 -97, 764 million tons of limestone was extracted.

From the distribution of above mentioned minerals it is very clearly noted that the state of Punjab has no place in the production of any of these minerals. This is because of the fact that most of the state is alluvial plain made of soils brought and deposited by rivers, which is very fertile for agriculture. The mineral resources are mainly found in the regions with igneous and metamorphic rocks.

SOURCES OF ENERGY

Now we will briefly explain the distribution and usable reserves of some major sources of energy. Coal, mineral oil and hydroelectric power are the three major sources of energy. The fourth source of energy is nuclear power.

1. COAL

It is the most important industrial fuel till present. Alongwith this, it is used as an important raw material in iron and steel and chemical industries. 60% of the total carbonic demand in the country is fulfilled from coal and lignite.

Coal is the most extensive of all the mineral reserves. Our country is one of the three largest coal producing countries in the world. China and United States of America are the only countries that produce more coal than India. Almost all the coal reserves of the country are found in south Indian rocks belonging to the Gondwana age. An examination of the distribution of coal reserves in India, reveals that, three -fourth of the total coal reserves are present in Damodar valley region. The major coal areas here are Raniganj, Jharia, Giridih, Bokaro and Karanpura. All these areas fall in Bengal, Bihar and Jharkhand



states. Also, Singrauli, Umaria, Suhagpur, Solhat, Korba and Ramgarh districts Madhya Pradesh; Deogarh and Talcher of Odisha; Chanda district of Maharashtra and; Singreni district of Telangana are the major mining regions.

After independence, coal mining industry was nationalized. It was done to avoid exploitation of mining workers, to manage mines in a planned manner and to preserve environment in such regions. The main coal regions of the country now are: Raniganj, Jharia, eastern and western Bokaro region; Panchkanhan and Tawa valley; Singrauli; Chanda –Wardha region, Talcher and Godavari valley region etc.

The total coal reserves in the country are estimated to be 72.90 crore tons. Out of this, non –coking coal is more than coking coal. According to a news item, on January1, 1997, the total coal reserves of India were 20465.3 crore tons. The Coal India Limited (CIL) which is a government organization is responsible for the management and administration of coal. This is the second largest organization in the world which employs 6.64 lakh workers. Coal has proved very useful in the generation of electricity and gas. Thermal plants of the country operated with the help of coal. This also helps in the decentralization of industries and saves on transportation cost.

The production of coal has increased rapidly after independence. The production has increased from 32.8 million tons in 1950 –51 to 113.9 million tons in 1980 –81. In 1989 –90, it reached 200.01 million tons and it was 296 million tons in 1997 –98. During this time, the consumption of coal has also increased manifold. After 1991, the production has been increased by changing the economic policy of the country and by encouraging foreign investment in mining industry.

Lignite, which is the poorest form of coal, is also called as brown coal. Its total reserves are comparatively less and are estimated to be around 27.5 million tons. Its major part, about 90% is found in Tamilnadu in Neyvelli and its surrounding regions. The entire state has benefited from the large reserves of lignite as the state gets electricity from the thermal plants set up in Neyvelli.

Nearly 90% of coal produced in India is used in thermal power plants. Punjab has three thermal power units, two in Ropar and one in Bathinda town. With these, the problem of shortage of electricity has been solved to a large extent. There is a great demand of coal in the iron and steel industry. One – fifth of the total production is used in this industry. Most of the remaining part is used in brick kilns, rail engines and for providing energy to the cement and fertilizer industries.

2. MINERAL OIL AND NATURAL GAS

The consumption of mineral oil as a source of energy has increased significantly in the world. Countries having its excessive reserves have entered

the category of rich countries through oil exports. These are mainly the Middle East countries like United Arab Emirates, Kuwait, Bahrain, Iran, Iraq, etc.

India has many areas with known reserves of mineral oil. But commercial production is carried out from a very little area. According to an estimate, oil reserves are spread over 10 lakh square km of area in the country which is equal to one-third of the total area of the country. These are found in the Ganga and Brahmaputra plains; coastal belts; and continental shelves; Gujarat plains; Thar desert; and Andaman and Nicobar Islands.

At the time of independence, oil was extracted only in Assam state of the north eastern India from a very small field. It is the only field which is functioning for last 100 years. In the refineries located nearby at Digboi, oil is refined before being exported by pipeline to other parts of the country.

Mineral oil and natural gas was discovered in the plains of Gujarat and coastal regions after independence. Oil was being extracted from the reserves here at Ankleshwar. After this, the discovery of extensive off-shore reserves, 115 km away from the coast of Mumbai was a heartening incident for the country. This region is known as 'Bombay High'. Here the ship 'Sagar Samrat' specially manufactured in Japan was employed for discovering the oil. This was a challenging task in which the country became ultimately successful. In view of the huge demand for oil explorations are going on in the new areas. These are spread in the deep sea near the deltaic coasts of Godavari, Krishna, Cauvery and Mahanadi rivers. In Assam, new reserves have been struck. Recently, vast oil and natural gas reserves have been discovered by an Indian private company, Reliance industries, in the Krishna -Godavari basin.

In 1950-51, the production of crude oil in the country was about 3 lakh tons. It increased considerably to 68 lakh tons in 1970 -71 and 3.30 crore tons in 1990 -91 and then reached 3.28 crore tons in 1996 -97. But in 1988 -89, the crude oil production was 3.41 crore tons which was 3.21 crore metric tons in 2020. During the same time, the consumption of oil has also increased tremendously. Therefore, government is encouraging oil exploration in the country. In this direction, the government has new oil development projects since 1990. These projects include the development of recently discovered oil fields of Neelam, Mukta and Panna in the Bombay high basin and development of remaining reserves of L -II and L -III of Bombay High which is worth a total of rupees 8000 crore.

To increase the pace of oil exploration, government awarded bids for oil and natural gas exploration in 72 blocks of the country (39 off -shore and 33 on -shore) from the foreign companies besides two present Indian companies, the Oil and Natural Gas commission (ONGC) and Oil India Limited (OIL). Simultaneously, the government is also drilling oil in the medium and small sized oil fields.

Huge amount of oil is imported from foreign countries to fulfill the domestic demand. In 1990–91, the total production of crude oil and petroleum products was 2.94 crore tons for which country had to pay 107 billion rupees in the form of foreign currency. The continuous growth of imports of petro products is a matter of great concern. In 1996–97 India had to import 5.41 crore tons of petro products imported which has increased to double in last five years. In 2019, this figure stood at 20 crore 53 lakh ton. Crude oil and petroleum products hold an important place in the deficit of imports and exports. Almost 82% of total imports exchequer of India is spent on petroleum products.

There are 23 oil refineries in the country at present while these were 12 only with a total refining capacity of 5.74 crore tons per annum at the end of 1999.

The increase took place with the expansion of these refineries which enhanced the capacity by 82 to 87 lakh tons. Besides these, 4 new refineries with a total capacity of 125 lakh tons were approved. These were Cauvery basin (Tamilnadu), Numaligarh (Assam), Karnal (Haryana) and Mangalore (Karnataka). According to another decision of the government, 3 new oil refineries have been established with a total refining capacity of 6 million tons. These have been set up in eastern, central and western India. At the same time, setting up of refineries in private sector has also taken place.

Natural gas plays very important role in our life. Its reserves are usually found along with the oil fields. Therefore, where ever oil reserves are found, natural gas is also found at that place. However, natural gas may also occur separately. Such separate regions have been found in Tripura and Rajasthan. Besides these, off-shore reserves of natural gas have been found in deep sea areas of Gujarat, Maharashtra, Tamilnadu, Andhra Pradesh and Orissa.

In 1980 –81, the total production of natural gas was 235.80 crore cubic metres, which increased to 2231 crore cubic metres in 1995 –96. The production of this gas is rapidly increasing. For example, during 1994–95 and 1995–96, 15.1% growth rate was recorded in its production which rose to 2411 million cubic meters in 2019-20.

Natural gas is a clean and very good source of energy. It is used as a raw material in petro–chemical industry. Establishment of powerhouses based on natural gas takes less time as compared to other sources of energy. It also helps in increasing the agricultural production in the country. Nowadays, it is also used in manufacture of fertilizers. Natural gas is easily transportable over long distances, easily through pipelines from one place to another. At present, gas is being transported from regions of Mumbai and Gujarat to Madhya Pradesh, Rajasthan and Uttar Pradesh. The “Hajira–Bijaipur, Jagdishpur” gas pipeline which is 1730 km long runs from Hazira on the west coast through Bijaipur in Madhya Pradesh to Jagdishpur in Uttar Pradesh. Through this, gas

is supplied to 6 fertilizers plants and 3 power plants. A government institution called the 'Gas Authority of India Ltd. (GAIL)' was entrusted with this task in 1984. This authority also plans and constructs pipelines for distribution of natural gas. It has also taken up the responsibility of construction of many other pipelines. These pipelines may be laid in the Tatipaka-Kakinada region (Andhra Pradesh) and in Maharashtra and areas around Delhi.

The gas used for cooking is called as the Liquefied Petroleum Gas (LPG). Its use is increasing for cooking purposes both in the villages and cities. This is a fast and clean fuel. Its demand as domestic fuel for other industries will help in reducing the indiscriminating cutting of our forests. Since, there is a wide gap between the demand for the cooking gas and its fulfillment through the domestic sources, therefore, LPG has to be imported. In this area, alongwith the Gas Authority of India Limited (GAIL), other organizations like Oil and Natural Gas Commission (ONGC), Indian Oil Corporation (IOC) and Hindustan Petroleum Corporation (HP) are also working. Now, private investment is also being welcomed in this sector. This policy is a diversion from the country's policy prior to 1991. Earlier this industry was fully under the government control.

3. THERMAL AND NUCLEAR POWER:

Thermal power is generated by using coal, petroleum and natural gas in thermal power houses. These mineral resources which are used as a raw material in the generation of thermal power are also called as the fossil fuels. They can not be used more than once or they are non-renewable resources. This is their major disadvantage or demerit. Large quantity of coal-ash is left behind near the thermal power houses after the use of coal which endangers the surrounding environment. On the other hand, the use of coal and petroleum also causes pollution in the atmosphere. Therefore, thermal power like the hydel power is free of pollution for the far off areas similar to the hydel power.

Electricity can also be generated from the atomic fuel or heavy water besides coal, petroleum and gas. You might be knowing well about the hydel power. Electricity generated from water is called hydel power; from coal, petroleum and gas is called as thermal power and that produced from atomic fuel or heavy water is known as atomic power.

Electricity is widely used in our agriculture, industry, transportation, communication and domestic works. In a way today's life seems impossible without electricity.

In 1995-96, the total electricity generation from these three sources was 351 billion. Nearly three-fourth (74.9%) of this was generated in the thermal power houses. The remaining 23.5 per cent of the electricity was generated in hydel power houses and only 1.60 per cent by the atomic power. The share of thermal power is increasing very fastly with the passage of time.

The installed capacity of electricity in the country was 8.18 thousand MW till 1994 -95. A further increase of 30858 MW units was to be achieved during the 8th five -year plan (1992 -97) but increase of only 14799 MW of units or 48% was attained in the first four years of the plan. Therefore, large gaps are found in the actual production and installed capacity in the country. The electricity is supplied to different parts of the country by the National Grid System. Our Punjab is located in the northern region of this grid. The National Thermal Power Corporation is responsible for the construction of thermal power stations and generating electricity etc. in the country. In Punjab, thermal power stations are located at Ropar and Bathinda. A new plant named Sri Hargobindpur Thermal Plant has been started on 29 December, 1997 at Lehra Mohabbat in Bathinda district. The production capacity of its first unit is 210 MW. Combined power production in 2020 has been 3,79,130 MW.

Besides these, there are many more hydel power projects out of which Bhakhra-Nangal project is the most important and has the largest capacity of electricity generation.

Immense progress has been made in the transmission and distribution of electricity in the country. In 1950, the length of the transmission lines was 10,000 circuit km which increased to 2.18 lakh circuit km in March 1992. In addition, there are 400 KW high voltage transmission lines. Their length was 26,000 circuit km in March 1992. Besides this, first 500 KW HVDC bipole Rihand-Dadri transmission line is also working with a length of 820 km. An inter-regional link line is also working presently which links western and northern regions. The major objective of the introduction of National Power Grid System is to encourage the centralized system in the electricity power sector and to transmit power from one system to another system so that available resources of the country could be used optimally. Even today only 60 -62% of the total installed capacity of the electricity power production centres of the country, is being utilized. Proper care and attention can only increase the work efficiency.

In the five-year plans, more attention has been paid to the expansion of electric power in the rural areas. The schemes related to rural electrification are executed both by the state governments and rural electrification boards. Till 1991-92 a total of 4.88 lakh villages have been electrified and 96 lakh electric tubewells have been installed in these villages. In this way, 84% of the villages have been electrified. In Punjab, all villages have been electrified. The main objective under the rural electrification project is to give special attention to provide electricity to the tribal regions and in the villages.

ATOMIC POWER

Atomic power stations established in those regions where the other sources of energy are not available or sufficient are not fulfilling their need. India is considered a progressive country in the peaceful utilization of the atomic power in the medical and agricultural areas.

Vast reserves of some atomic minerals are found in the country. There are mines of Uranium in some parts of Bihar and Rajasthan. Monazite sand found in coastal areas of Kerala is a primary source of atomic energy from which Thorium is extracted. Cherolite, Zirconium and Palesar are also atomic minerals. India has their vast reserves. Widespread reserves of graphite have also been discovered in mountainous parts of eastern India.

The country has 4 centres of nuclear energy. These include Tarapur on the Maharashtra –Gujarat border; Rawatbhata near Kota in Rajasthan; Kalapakkam in Tamilnadu, and Nowrang in the Bulandshahr district of western Uttar Pradesh. In the 1994–95, their total production was 5.6 billion KW which was a little less than 2% of the total electricity production of the country. Continuous exploration and development tasks are going on in the country so that proper care of atomic power houses, their maintenance and manufacture of atomic fuel, could be accomplished in the country itself. Nuclear reactors are needed for generating electricity from the atomic fuel. These are imported from foreign countries. Some countries which are very rich in nuclear power do not want that countries like India should use this power independently in their country. Therefore, they are trying to bring Indian nuclear program under the international inspection. Recently, they have again tried to get signed an international treaty from India. The Indian reaction to this suggestion is that this treaty is discriminatory and this will restrict the poor countries like India from using the atomic power for peaceful purposes. Due to such an international policy, the country is facing problems in the supply of related necessary equipment. Therefore, the scientists of the country are investigating to find alternative methods. Recently, the Indian scientists achieved great success when they successfully repaired one of the units of Rawatbhata atomic reactor in Rajasthan through indigenous techniques which was not operational for a long time. This not only saved crores of rupees of foreign currency but also have brought laurels to Indian nuclear program.

NON –CONVENTIONAL SOURCES OF ENERGY:

In these sources, the use of energy like solar energy, wind energy, tidal energy, geo –thermal energy and energy derived from organic products, is very old. To run the boats, the use of wind, flowing water and human power dates back to the ancient times. Earlier, a large number of wind mills preparing flour. These wind mills were being used for were also used for irrigation purposes.

In the present period, their importance is increasing day by day due to their specific characteristics and some drawbacks of conventional sources. One of the main characteristics of these sources is that all these inexhaustible resources are renewable or mostly are still unused. The biggest advantage of the non–conventional sources is that they are very cost effective. Besides this, they can be used in the coastal, hilly or desert like remoter and barren lands.

On such lands, the laying of electricity lines and their management is very costly. The utilization of such non-conventional sources of energy should be encouraged in these kind of areas. It also strengthens the policy of decentralization.

The centralised system of electrification has some disadvantages also, besides having some advantages. It is very costly to construct large transmission lines and big power distribution centres. Also many administrative problems can also occur. Problems like lack of decentralization, and pollution etc. also come to the fore. Keeping all these things in view, stress is being laid on greater use of non-conventional sources of energy. Government has given top priority to increasing the use of non-conventional sources of energy. Besides decentralization, these have a special role to play in afforestation; conservation of environment, power saving; creation of employment opportunities; improvement in health and sanitation; social and women welfare; irrigation and production of organic fertilizers in agriculture, etc. In March 1981, the central government established a high powered authority board to locate more sources of energy. In 1982, the department of non-conventional sources of energy was set up by the centre in the form of power ministry. The state governments have also established separate agencies for the non-conventional sources of energy. With the cooperation of general public, preference is being given to works like provision of cooking gas at the local level, small irrigation projects, drinking water and street lighting etc. These works are of great importance in the remote areas, hilly regions and for the poor people.

Wind mill energy is very helpful in providing irrigation facilities in the rural areas. It is estimated that wind is used for producing 2000 MW of electricity. Gujarat, Tamilnadu, Maharashtra and Orissa are the most important areas where windmill centres are working at many places and electricity produced by these centres is added into the grid system.

Tidal energy is a cheap and inexhaustible source of energy. Runn of Kachchh and Cambay are the most suitable places for generating electricity through tidal energy because tidal water rise very fastly in these narrow inlets.

Geo -thermal energy has not yet been properly introduced in the electricity generation of the country because it is available in very small amount in the country. Efforts are being made to produce electricity from hot water geysers located in Manikaran in Himachal Pradesh.

Getting energy from trees is also being paid attention through planting more trees on barren and eroded regions. In these regions, fast growing trees are being planted so that they can be used as fuel wood. With this, solution can be found to problems of rural unemployment and fuelwood.

Electricity is also being generated from urban waste in the big cities. In our country most of the garbage is bio-degradable. In Delhi, a machine is already functioning for generating electricity from urban waste. Such efforts

are also being made in other cities. With this the problem of collecting and dumping of large heaps of city garbage is solved and also electricity is generated from waste.

The '**Power village scheme**' has been implemented by the government of India in remote rural areas having barren lands. This has been done with the objective of fulfilling requirements of electricity in these remote villages. Under this scheme, 'gobar gas plants' have been established in the villages by using organic matter, cow dung, human excreta etc. These have been established at individual, community and village levels. In the larger cities, biogas machines are also being operated from the sewerage water. The Power Village Scheme was completed in 184 villages till March 1993. Besides this, this scheme was at different stages of completion in other 222 villages. The survey related to this has been completed in 1680 villages and it is going on in 344 villages.

A program for **smokeless stoves is being planned** at the national level. Its major objective is to save fuel and solve the problem of rural women for collecting fuel wood. Maximum amount of energy is used in the kitchen, in which wood is used on a large scale. In the traditional domestic stoves, large quantity of wood is consumed and also lots of smoke is produced. The scheme of smokeless stoves was started in the country in December 1983. It is estimated that one smokeless stove can save about 700 kg of fuelwood in a year. The use of these stoves save 20 to 35% of fuelwood. Till March 1993, about 142 lakh developed type of stoves had been installed in the country.

SOLAR ENERGY

Solar energy is an inexhaustible source of energy. It is omnipresent and also has large potentialities. Solar energy can be used very cheaply for water-heaters, cooking, air-conditioning, refrigeration, removing water salinity, distillation etc. Till March 1993, an area of 2.80 lakh km² had been established for collecting solar energy in the country where it was used for the above works. By the same time, 2.40 lakh solar cookers had been sold in the country. In a state like Rajasthan, where solar radiation is available for most of the year without any climatic disturbance, the solar energy is going to will be helpful in providing electricity to the widely scattered villages. It is a future source of energy because other sources of energy like coal and petroleum will be finished in the near future.

Exercises

I. Write short note the following objectively :

1. Name the important minerals?
2. What are the uses of Manganese?
3. What is the position of India amongst the manganese ore producing countries of the world?
4. Name the position of India amongst the Mica producing countries in the world?

5. Name the states that produce more than half of the total production of Mica.
6. Name the industries in which Mica is used as raw material.
7. Which mineral is obtained from Bauxite ore?
8. What are the uses of Copper?
9. Name the place and state where maximum gold is produced.
10. In which industry is the lime stone used to the maximum?
11. What is the place of India in coal production in the world.
12. What is the percentage of coal reserves found in Damodar valley.
13. Which organisation controls the managements of coal production?
14. Name the four major atomic energy producing centres.
15. What is Wind Energy?
16. Which material is extracted from Bailadilamins?
17. Name the material extracted from kolar mines?
18. What is the other name given to lignite?
19. For which work is the ship 'Sagar Samrat' used?
20. Which energy is derived from Uranium?

II. Answer the following questions in short :

1. Describe the role of minerals in the national Economy.
2. Name the manganese producing states of India?
3. Name the major Bauxite producing centres.
4. Name the copper producing centres in India.
5. What are the causes of non availability of minerals in Punjab?
6. Name the coal producing centres in India.
7. Name the main coal producing centres in Orrisa.
8. What were the causes of nationalisation of coal production?
9. Name the non conventional sources of Energy?
10. Describe the importance of wind energy in India.
11. What is the role of Indian Govt. in mining industry?
12. From which districts in Madhya Pradesh is iron are extracted?
13. Name all the institutes associated with exploration, refinement and regional distribution of oil.
14. Why solar energy is said to be future energy reserve?
15. What is the importance of natural gas in manure industry?
16. What are the problems faced in the regional distribution of hydroelectric energy in India?
17. Describe in brief the importance of mineral reserves in India.
18. Describe about the main iron ore producing centres of India.

19. Describe the efforts made in the field of exploration and refinement of oil in India after independence.
20. Describe about development in the electrification process in villages after independence.
21. Write in detail about 'Power village scheme'.
22. Write about a program for Smokless stoves is being planned at the national level.
23. Describe solar energy as an inexhaustible source of energy. Which parts of the country can make maximum utilizations of solar energy?
24. Write a short note on the progress made in generation of hydro-electricity?
25. Describe about the peaceful utilization of atomic energy in India. Also Write about the related international pressures due to this.

III. Answer the following questions subjectively :

1. Describe in detail the main problems which are being faced with the increase in coal production.
2. Describe about the progress made by India in development of atomic energy.
3. Write about the importance and development of non conventional sources of energy.
4. Describe the role and importance of energy in industrialization of India.

IV. Show/ Mark the following on the map of India.

1. Iron ore producing areas.
2. Manganese producing areas.
3. Coal producing areas.
4. Centres of atomic energy.
5. Iron producing areas of Damodar Valley.
6. Four major reserves of Bauxite.
7. Gold producing areas in Kolar.
8. Lignite coal producing areas.

CHAPTER 7

POPULATION

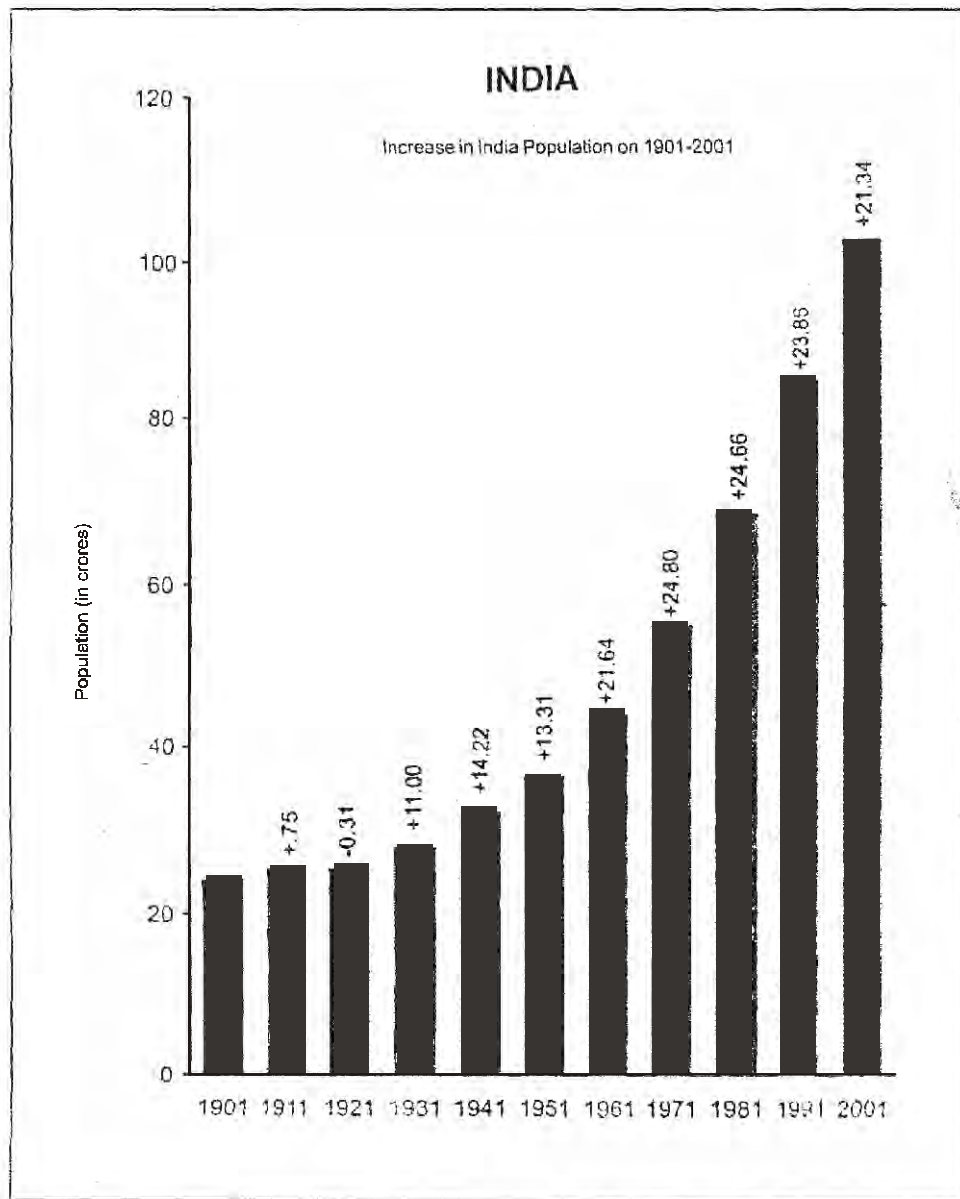
Population : As a Resource

A physically and mentally strong citizen is most important and valuable resource of any country. Be it the matter of country's security or its economic development, an intelligent and adept citizen can support the country in a planned way.

In today's knowledge and information-based world, the role of human resources in country's development is being realized more than before. Now, all the countries of the world, especially developing countries are paying more attention towards the development of human resource. Students, can you think, why it is so? The credit for the ongoing fast development in countries known as 'Asian Tiger' comprising South Korea, Taiwan, Hong Kong, Singapore and Malaysia, is given to the heavy investment done on human resource during the last few decades. In the development of human resource, not only the indicators like education, technical skill, health, and way of upbringing, but also other indicators like human character and way of thinking, culture and civilization, castes and national pride should also be included. Only then the human resource development can become the complete approach.

In India too, more attention is now being paid to the development of human resource. According to India – based economist, Prof. Amartya Sen, the most important and pathetic mistake of the Indian planning is of not paying full attention to the development to human resources. He considers this as one of the factors in our economic backwardness. According to him, the benefits of economic development in independent India have not reached the poor, women and weaker and deprived sections of society due to the less attention paid to the issues of social justice. Therefore, great social, economic and political inequalities have emerged along with economic development. One main reason relating to caste, religion and regional agitations seen nowadays in different parts of the country, is not paying full attention to the development of human resources.

Keeping in view the important contribution of human resource in the entire development of a country, the present chapter is devoted to the study of many characteristics of population of India like distribution, density, growth, age- structure, gender –ratio, rural –urban distribution, education, economic composition etc.



INDIA : POPULATION CENSUS

Growth and Distribution of Population in the past

Indian sub continent is one of the few regions of the world where concentration of population has been recorded since olden times. In Indian sub continent, the birth and development of one of the world's oldest civilizations has taken place. According to an estimate, at the time of Akbar's death in 1605, the population of India was 10 crore. It is estimated that it was 19 crore in 1750 and 23.3 crore in 1850. This population used to witness a generally gradual increase but during wars, epidemics and drought/ floods it used to decline steeply. Nowadays fast changes have taken place these problems. The modern medical science and technology have overcome the deaths due to epidemics and starvation. As a result, the population of India, which was 23.8 crore in 1901, became 35.9 crore in 1951 and increased to 102.7 crore in 2001 and to 121 crores in 2011. In this way, the population of India has increased more than four times from the beginning of this century till present and since independence, it has increased three times which is clear from the table below:-

Table 7.1 India : Population, 1901 –2011

Year	Population	Decimal Growth Rate (%)	Mean Annual Exponential Growth Rate (%)	Increasing growth Rate after 1901
1901	23,83,96,327	–	–	–
1911	25,20,93,390	+ 0.75	0.56	+ 5.75
1921	25,13,21,213	–0.31	–0.03	+5.42
1931	27,89,77,238	+11.00	1.04	+17.02
1941	31,86,60,580	+14.22	1.33	+33.67
1951	36,10,88,090	+13.31	1.25	+51.47
1961	43,92,34,771	+21.51	1.96	+84.25
1971	54,81,59,652	24.80	2.20	+129.94
1981	68,33,29,097	+24.66	2.22	+186.64
1991	84,63,02,688	+23.86	2.14	+255.00
2001	1,02,70,15,421	+21.34	1.93	+330.80
2011	1,21,01,93,422	+17.64	1.79	+366.74

Source : Census of India, 2011, Final Population Totals

Draw some conclusions from this table. A look at this table reveals that population has steeply increased after the years 1921 and 1951. Due to this,

the years 1921 and 1951 have been considered as 'population divides'. One of the main reasons of steep increase after these decades has been the sharp fall in the death rate.

Our country is considered as the second most populous country after China (100 crores). This population is more than the total population of the United States of America and the Soviet Union. More than seven times the population of Pakistan lives in India.

Implications of Large Population :

The huge population of the country has many implications some of which are positive and some negative. In the positive implications, first of all, it is the large population due to which India has political recognition in the world. Along with this, a huge market becomes available for selling the Indian goods within the country itself and secondly, vast human power also becomes available. Large domestic market and human power together helps in the fast economic development. On the other hand, the negative implications of large population include heavy pressure of population on the resources, low per capita income and lack of housing facilities, long queues, problems of management of large population etc.

Inter-state variations in Population :

India consists of 28 states and 7 Union territories. The total population of these is about 121 crores and 01 lakhs. Therefore, the average population of each state comes out to be 4 crores. Uttar Pradesh is the most populous state of India which has about 16 crore of population. On the other hand, the least populated state is Sikkim with 5.4 lakh of population. In India, there are nearly 10 states which have more than 5 crore of population. These includes the states of Uttar Pradesh, Bihar, Jharkhand, Maharashtra, West Bengal, Andhra Pradesh, Madhya Pradesh, Rajasthan, Karnataka and Tamilnadu. Besides this, National Capital Region of Delhi, which is a Union Territory, also has more than 5 crore of population. Similarly, in the second place, there are 8 states, where the total population is less than 50 lakhs. Except Sikkim, these include the states of Mizoram, Arunachal Pradesh, Nagaland, Meghalaya, Manipur, Goa and Tripura. In our own state Punjab, the population is more than 2.75 crores. Population wise, Punjab is ranked 15th among the 29 states of India and it accounts 2.5% of the total population of the country.

It is clear from Table 10.2 given on the next page that there exist wide inter state disparities in the distribution of population. For example, on the basis of total population, the population of the largest state Uttar Pradesh is about 374 times more than the population of smallest state of Sikkim. Can you think about the implications of the variations in distribution of such large population? Some implications may be such as large difference in the number of members of Parliament from different states. For instance, 85 members are elected for the Lok Sabha from Uttar Pradesh whereas Sikkim is represented

Table 7.2 : Statistics of States and Union Territories of India

S.No.	Name of state	Area (Sq. Km.)	Total Population	Density (Persons per Sq. Km.)	Literacy rate (Percent)	Gender Ratio Females Per Thousands Males)
INDIA		32,87,263	1,21,01,93,422	382	74.04	940
(i) STATE						
1.	Andhra Pradesh	1,60,205	4,93,18,668	306	67.84	—
2.	Arunachal Pradesh	83,743	13,82,611	17	66.95	920
3.	Assam	78,438	3,11,69,272	397	73.18	954
4.	Bihar	94,180	10,38,04,637	1102	63.82	916
5.	Chhattisgarh	135,039	2,55,40,196	189	71.04	991
6.	Goa	3,702	14,57,723	394	87.04	968
7.	Gujarat	196,024	6,03,83,628	308	79.31	918
8.	Haryana	44,212	2,53,58,081	573	76.64	877
9.	Himachal Pradesh	55,673	68,56,509	123	83.78	974
10.	Jharkhand	79,614	3,29,66,238	414	67.63	947
11.	Karnataka	191,791	6,11,30,704	319	75.60	968
12.	Kerala	38,863	3,33,87,677	859	93.91	1084
13.	Madhya Pradesh	308,087	7,25,97,565	236	70.63	923
14.	Maharashtra	307,713	11,23,72,972	365	82.91	946
15.	Manipur	22,327	27,21,756	122	79.85	987
16.	Meghalaya	22,492	29,64,007	132	75.50	986
17.	Mizoram	21,081	10,91,014	52	91.58	975
18.	Nagaland	16,579	19,80,602	119	80.11	931
19.	Odisha	1,55,707	4,19,47,358	269	73.45	978
20.	Punjab	50,362	2,77,04,236	550	76.68	843
21.	Rajasthan	342,239	6,86,21,012	201	67.06	926
22.	Sikkim	7,096	60,76,888	86	82.02	869
23.	Tamilnadu	130,058	7,21,38,958	555	80.33	995
24.	Telangana	1,14,840	3,53,44,865	310	67.22	—
25.	Tripura	10,486	36,71,032	350	87.75	961
26.	Uttarakhand	53,331	1,01,16,752	189	79.63	991
27.	Uttar Pradesh	2,40,928	19,95,81,477	828	69.72	908
28.	West Bengal	88,752	9,13,47,736	1102	77.08	947

S.No.	Name of state	Area (Sq. Km.)	Total Population	Density (Persons per Sq. Km.)	Literacy rate (Percent)	Gender Ratio Females Per Thousands Males)
(ii) UNION TERRITORIES						
1.	Andaman and Nicobar Islands	8,249	3,79,944	46	86.27	878
2.	Chandigarh	114	10,54,686	9252	86.43	818
3.	Dadra and Nagar Haweli	491	34,28,053	698	77.65	775
4.	Daman and Diu	112	2,42,911	2169	87.07	618
5.	Delhi	1,483	1,67,53,235	9340	86.34	866
6.	Lakshadweep	32	64,429	2013	92.28	946
7.	Pudducherry	492	12,44,464	2598	86.55	1038
8.	Jammu & Kashmir	222,236	125,48,926	56	68.74	883
9.	Ladakh	(combined)	(combined)	(combined)	(combined)	(combined)

Source : *Census of India (2011) : "Provisional Population Statistics", India Series-1, Paper of 2011, India Registrar General and Census commissioner, India, New Delhi.*

by only one member. From our own state Punjab, 13 members are elected for the parliament, while 67 are from Bihar. On the other hand, problems like the distribution of financial aid to the states by the centre on the basis of their population, difficulty in administration of bigger states and the rise of voice for the formation of smaller states out of the bigger states etc., are the result of uneven distribution of population.

Population Distribution and Density :-

The study of regional distribution of population provides a basis for understanding the various aspects of population. Therefore, an understanding of regional distribution of population is very essential. Firstly, we should have a clear understanding of the difference between horizontal distribution of population and density of population.

The distribution of population is related to the place and density is associated with a ratio. The distribution of population indicates whether the regional pattern of population is nucleated, agglomerated or linear etc. On the other hand, in density, emphasis is given on the ratio between the man and land and is related to the size of population and area.

The history of human settlements in India is very old. Therefore, the population resides in regions suited to human settlement. But the distribution of population is very strongly affected by the fertility of land. Being an

agricultural country, the regional pattern of distribution of population in India depends upon the agricultural productivity. That is why, large concentration of population is found in areas where the agricultural productivity is high. Other than agricultural productivity, natural physical factors also play an important role in the regional pattern of distribution of population.

Some important characteristics of the distribution of population in India are as follows:-

1. The distribution of population is very uneven. The population is very dense in river valleys and coastal plains while it is sparse in the hilly, desert and drought affected areas. It is important to mention here that the northern mountainous areas have only 16% of the country's area on which only 3% of population lives whereas 40% of population resides on only 18% of area in northern plains. Similarly in Rajasthan only 2 percent population lives on 6 % area of the country. In other words, in more than half of the districts, more than average or below average population resides.
2. Most of population lives in rural areas. Out of the total population of the country, about three-fourths lives in villages whereas only one -fourth resides in urban areas. The rural population is widely distributed in 5 lakh rural settlements. Urban population is heavily concentrated in big cities. One -third of the total urban population is found in 302 cities with more than 1 lakh population.

Many problems arise from this type of distribution of population. It is not only expensive but difficult also to provide basic facilities and amenities like linking the widely spaced different sized villages by roads, and developing their interaction with the neighbouring cities; education, pure drinking water facility, security and health facilities. On the other hand, problems like pollution, transportation difficulties, shortage of houses and lack of pure drinking water facility etc. are arising in the big cities.

3. Another important feature of this type of distribution of population is the settlement of minority groups in the sensitive border areas of strategic significance. For example, in northwestern India on the strategic Indo-Pak border there is large concentration of Sikh population in Punjab and Muslim population in Jammu and Kashmir. Similarly, in the northeast, Christian population is more concentrated in areas bordering China and Myanmar. This type of distribution results into many social, economic and political complexities.
4. The population is heavily concentrated in the coastal plains and river valleys while its distribution is sparse in the mountainous, plateau and desert areas. If we see the distribution of population on the map, it looks like a demographic divide.

Density of Population

The 12101 lakh or 121.01 crore of population of India resides on 32.8 lakh square km of area. On this basis, if we assume that the population is evenly spread throughout the country then the density of population comes out to be 382 persons per square km. In other words, it can also be described as average density of population. However, large variations are found in the density of population at regional level. The density of population is highest (1102 persons per square km) in Bihar and lowest (17 persons per sq km) in Arunachal Pradesh. This difference is very sharp in the centrally administered territories, e.g. the density of population is 9340 persons per square km in National Capital Region of Delhi, whereas it is only 46 persons per sq km in Andaman and Nicobar Islands.

A look at the population density map reveals that areas of high density of population extend from Punjab in the northwest to the deltaic areas of Ganga in West Bengal in the east. In addition to this, density of population is very high in the eastern and western coastal plains. In contrast, the density of population is low in the central parts of the country like Madhya Pradesh and adjoining parts of the states of Chhattisgarh, Rajasthan, Andhra Pradesh, Maharashtra and Orissa. On the whole, the Himalayan region in the north too makes a low density area.

Spatially, high density (more than 400 persons per sq km) areas fall over the deltaic parts of Sutluj, Ganga, Brahmaputra, Mahanadi, Godavari, Krishna and Cauvery rivers where agriculture is well developed due to the fertile soils and adequate rainfall. Besides these, high density of population is also found near large industrial and administrative centres like Ludhiana, Gurgaon, National Capital Region of Delhi, Kanpur, Patna, Kolkata, Mumbai, Chennai, Ahmedabad, Bangalore and Hyderabad. In this way, the density of population is high in the areas where due to adequate rainfall and irrigation, intensive agriculture could develop and where industrial cities have developed. Can you identify the densely populated areas on the map? After identification, can you find out the reasons as to why the density of population is high in these areas? Can you find any relationship between physiography, rainfall distribution, urban industrial development in the country and density of population?

In contrast, the areas of low density of population (below 200 persons per sq km) are the physically handicapped regions. These areas include, in the Himalayan ranges in the north the states of Jammu and Kashmir, Himachal Pradesh, Uttaranchal, Arunachal Pradesh, Sikkim, Nagaland, Manipur, Mizoram and Meghalaya; in the west the desert areas of Rajasthan, and marshy areas of Gujarat; in central India and interior Peninsular plateau the states of Madhya Pradesh, Chhattisgarh, eastern Maharashtra, eastern Karnataka, western Andhra Pradesh and few parts of Tamilnadu.

Besides these areas, the regions which lie outside the high density areas are known as moderately densely populated areas (200 to 300 persons per sq km). Generally these areas are transitional to the low and high density areas and are less in number. From this it can easily be inferred that there exist wide variations in the regional distribution and density of population in India.

1. The traditional rice producing areas of the country are the most densely populated areas.
2. After this, the second position is of the wheat producing areas. During the last few years, the difference in the density of population of wheat and rice producing areas has gradually decreased. This is because large amount of population is migrating as workers from the rice producing eastern states like Uttar Pradesh, Bihar, Orissa and West Bengal to wheat producing states. That is why, labourers get employment in wheat growing regions of Punjab, Haryana and Western Uttar Pradesh.
3. The third place in the density of population comes of the bajra and Jowar producing areas, where the density is low. In sum, the density of population and production potential of different parts of the country are strongly correlated.
4. In the different parts of the country, there is a lack of strong inter-relationships between density of population and economic development. In other words, it would not be wrong to say that all areas of high pressure of population are either economically backward or are developed. For example, in Punjab - Haryana plains the density of population and development level are both very high. But on the other hand, in the middle Ganga plain, the density of population is very high but the level of economic development is very low.

POPULATION COMPOSITION

First of all, it is very essential for us to know as to why should we study the population composition of a country. For the socio-economic planning, data regarding different features of the population of a country such as age structure, gender composition, occupational structure etc. are needed. The different elements of the population composition have a strong relationship with the economic development of the country. Whereas, on one hand these elements of population composition are affected by the economic development, the growth and level of economic development on the other hand are affected by them. For example if the percentage of children and old people is very high in the population of a country then the country has to allocate more financial resources on the basic amenities and facilities like health and education. On the other hand, in age structure, if the percentage of working age group is high then a good and large contribution in economic development can be expected. We will discuss briefly the age, sex and occupational composition of the population of India in order.

(I) Age Composition

Age structure of any country or area can be measured with the help of three elements. These elements include fertility, mortality and migration. Any change in one of these elements affects the other two. These three elements together affect the economic and social conditions and also on the age structure. For example in the countries where the birth rate is high, the percentage of adult age group will also be high. In contrast to this, in those countries where the birth rate is low and the life expectancy is high, the percentage of child age group will be very less. In rich countries, child age group (0 –14 years) constitutes only 20.5% of the total population whereas in poor countries this is 35.7 per cent. On the other hand, in the age group of 65 years and above, 12.7% population is in case of persons in the rich countries and only 4.5% population in the poor countries.

Table 7.3 : World - Age Structure

Region	Population in Age Group (Percentage)		
	0-14 yr	15-64 yr	65+ yr
World	33.4	60.7	5.9
High Income Countries	20.5	66.8	12.7
Middle Income Countries	36.6	58.6	4.8
Low Income Countries	35.7	59.8	4.5
United States of America	21.2	66.7	6.1
China	27.6	66.0	12.4
India	35.7	59.5	4.8

India, which comes in the category of poor countries, has 35.7% of its population in the age group of 0 –14 years and only 4.8% in the 65 years and above age group. Rest of the 59.5% of population falls in the 15 to 64 years of age group. In the world as a whole, however, 60.7% of the population is in this age group whereas in rich countries the percentage of population in the age group of 15 to 64 years is 66.8. In our neighbouring country China, 66.7% of the population is in this particular age group.

Actually, the 15 to 64 years age group is considered as the working age group, while the remaining population in the other two groups is the dependent population. After having a look at Table 10.3, it is observed that the population of this working age group in India is very less not only in the world but also in comparison to our neighbouring country China and the rich countries. Therefore there is a tremendous pressure of dependent population in the country.

The analysis of age structure has many advantages. The knowledge of the total population in the child age group of 0 –14 years makes the government know very clearly facilities required to be provided in education, health and social services sector. Accordingly, new schools, health centres, community centres, etc. can be constructed. Along with this, the knowledge of number of people having voting rights is essential for the democracy. As per the statistics of age structure, there should be 54% voters in the country, but their proportion is about 60%.

(II) Gender Composition

The population of a country can be used to know the social, cultural, economic and political conditions prevailing in that country. In India, sex ratio is understood in terms of number of females per thousand males. These days women are treated at par with men. In most of the rich countries, the number of females is more or higher than the number of males. In developed countries, the average gender ratio is 1050 females per 1000 males whereas it is 964 in the developing countries. As per the 2011 census, the gender ratio in India is 940 females per thousand males. This is one of the lowest averages in the world. However, this ratio is 910 females per thousand males in Pakistan but low male –female ratio in our country is a source of worry. The gradual decrease in this ratio is still a more serious concern.

In 1901, the gender ratio in India was 902. For rural areas, this ratio was 980 and for urban areas it was 910. After independence, this ratio declined to 946 in 1951. At that time, this ratio was 965 in rural areas and 859 in the cities. In 1991, when this average was 927 for the entire country, it was 939 for rural areas and 894 for the urban. The average increased to 933 in 2001 and to 940 to 2011. In this way, the sex ratio has improved after independence in the urban areas but it has rapidly declined in rural areas, though the sex ratio is still high in rural areas as compared to the urban areas.

The analysis of sex ratio on the basis of population categories given below shows that the sex ratio is highest (1009/1000) among Christian population. On the other hand, the sex ratio is lowest (893/1000) in the Sikh population. In the Hindus and Muslims it is respectively 931 and 936. In Jains, this ratio is 940 while in the Buddhists it is 953. In this way, however, it is considered that the Muslim population is responsible for the low sex ratio in India, where the females are given less rights, but in contrast to this view point, the number of females is slightly high in the Muslim households than in the Hindu households in India.

It is very difficult to know the definite reasons for the low gender ratio in India. One of the main reasons however, is considered to be the low status of women in the Indian society. In the family system too, they are given lower status as compared to men. That is why in the child age-groups, less attention is paid to the issues like health, nutrition and care of the girl child. Therefore, the death rate is high among the girls as compared to the boys in the age group of 0 –6 years.



In this age group, the gender ratio has declined from 976 in 1961 to 945 in 1991. The other reasons include, the low counting of women as compared to men during population census, or reporting the number of males deliberately high during census, low birth rate of females, female foeticide due to social pressures etc.. In 2001, however, improvement can be seen in the age group of more than 7 years from 923 to 935 in the last ten years.

TABLE 7.4 : India - Gender Ratio

Religious Group (Census Years)	Gender Ratio (Females per thousand Males)
1901	972 (Rural = 980, Urban = 910)
1911	964
1921	955
1931	950
1941	945
1951	946 (Rural = 965, Urban = 859)
1961	941
1971	930
1981	934
1991	927 (Rural = 939, Urban = 894)
2001	933
2011	940
Religious Group	
Christians	1009
Budhists	953
Jains	940
Muslims	936
Hindus	931
Sikhs	893

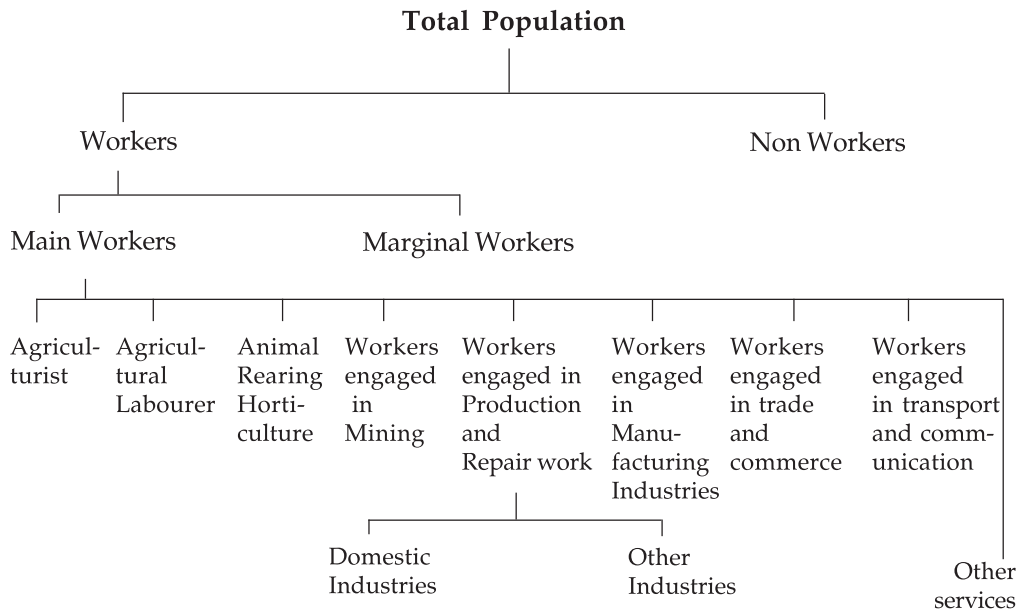
At the state level, the sex ratio is highest (1084) in Kerala but it is lowest (866) in National Capital Region of Delhi. Except Delhi, the states with low sex ratio are Haryana, Punjab and Jammu & Kashmir, where this ratio is less than 900. Except Kerala, the states with sex ratio of more than 950 include the states of Uttaranchal, Chhattisgarh, Goa, Himachal Pradesh, Manipur, Pondicherry, Andhra Pradesh, Karnataka, Orissa and Tamilnadu. The gender ratio of our Punjab is 893, which is comparatively more than the neighbouring

states of Haryana, Delhi and Uttar Pradesh but is less than Himachal Pradesh and Rajasthan. In total, the gender ratio is comparatively more in South India than the North India. The female –male ratio is relatively higher in the tribal areas of the Northeast and central India. In states of northern India especially Haryana, Punjab, western Uttar Pradesh, western Rajasthan, northwestern Madhya Pradesh, Union Territories and big cities, the sex ratio is relatively less than the other states.

(III) Economic Composition:

The study of the economic composition of population is very significant. Such a clearly explains the economic, demographic and cultural attributes of the area, which provide a basis for formulating future plans for its social and economic development.

In India, the population is divided into two categories as workers and non –workers. This category of workers is further divided into two groups as main workers and marginal workers. The main workers are those working people who have worked in any kind of economic activity for six months or (183 days) more. Marginal workers are those workers who were involved in some work for some time in the last year but have not took part in any kind of economic work. This category includes the students and housewives who are involved in the educational and household duties etc. The main workers are further classified into nine sub categories which is more clear from the following chart.



In India the ideas behind the classification of population on the basis of economic structure has been changing. It will not be wrong to say that this idea has changed in all the censuses conducted since 1951. This concept of classifying people as workers and non-workers, was introduced for the first time in 1961 census. But the definition of a worker has been changing. Therefore it is difficult to make any comparisons of the data on economic composition.

In India, the total percentage of main workers was 37.50% (except Assam and Jammu & Kashmir) according to the 1991 census. In the rural areas, this figure was 40% while in urban areas it was 30.2 per cent. In this way, only one-third of the total population is economically active. In other words, nearly two-third of the population is economically dependent on one-third of working population. The low proportion of labour force or high proportion of dependent population is attributed to the high growth rate of population. The dependency ratio of population increases due to many reasons such as large number of children encouraging the women to work outside, because to social constraints and lack of education and awareness.

The other main feature of economic structure, is that a large part of the total workers is engaged in the primary sector. Due to the agrarian base the Indian economy, about two-thirds of the total main workers earn their livelihood from the agriculture and allied activities. Only 11.6% workers are employed in the industries, which comprise only 10% of the total population. The remaining 20.5% workers are engaged in the tertiary services like trade and commerce, transportation and communication and other services. On the one hand, there is large pressure of population on the agricultural sector due to low manufacturing activities in the country, and on other hand, many new tertiary services have become a burden on country's economy. More than adequate workers are there in government and foot loose industries which puts extra burden on the Indian economy. To come out of this problem, we need to develop our industry in such a way so that maximum number of people get employed. Also there is a strong need of industrial development in areas far from the big industrial cities. For this it is important to provide a basic structure for industries in the backward areas on priority basis.

It is very important for the country to pay attention to issues like fast growth of national capital, eradication of regional and social inequalities increase in employment opportunities, environmental security, etc. for its economic development. It is almost impossible to know the capability of the nation in achieving all these goals on the basis total population, its density and distribution.

Therefore, the knowledge of economic composition of population, gender ratio, age structure, growth rate, health and education becomes very essential.

(IV) Residence (Rural-Urban Population):

India is still known as the country of villages. There are nearly 5 lakh 50 thousand villages in the country. In the beginning of the 20th century, 9 out of every 10 were living in a village. At the same time in 1901, the total urban population was only 2.6 crores (equal to the total population of Punjab at present). By the census year 1991, the urban population increased to 21.50 crore. In this way, the urban population has increased eight times in the past 90 years. In contrast to this, the total population of India has increased about three and a half time in the last 9 decades. Whereas, the rural –urban population ratio was 1:9 in 1901, it has changed to 1:3 in 1991. The urban population has rapidly increased after independence due to the increase in industrial development and administrative services.

You can see from the table that although urban population in India is only 25.6% but its base is very high (215 million) which is more than the total population of United States of America. Besides the large base, the urban population is increasing very fastly. Urban population is growing more than two times faster than the rural population. Similarly the population of large cities is increasing at a much faster rate than the population of medium and small towns. This can be seen from the fact that about 65% of the total urban population of the country in 1996 was living in Class I towns with a population of one lakh or more. There are about 300 such cities in the country. In 1961 i.e. 30 years ago, the number of cities in this category was only 106. Heavy concentration of population in the big cities has become a matter of great concern. Out of these 300 Class I towns, 23 cities are included in the category of metropolitan cities. A metropolitan city is a whose population is 10 lakh or more. 7 crore people live in these 23 metropolitan cities which makes one half of the total population (13.10 crore) of all such cities. There is heavy pressure on the basic amenities and facilities in big cities mainly due to rapid increase in their population. Sometimes people here do not get even the basic facilities. According to an estimate more than one –fourth of the total urban population of India lives in slums where there is lack of even basic public facilities. Problems like child labour, nutritional deficiency, unemployment, crime, illegal works etc. are related to slums.

On the other hand, in the villages, the problem of unemployment is becoming more serious. Therefore, a large number of young people are migrating

to the cities in search of employment. The size of land holdings is declining with the increase in population. Also the rural youths are getting fascinated towards the cities and their diversion from agricultural activities is increasing. Due to these reasons, large numbers of young people from rural areas of villages are migrating towards the cities in search of employment. The number of metropolitan cities in the country is increasing fastly. There were 12 metropolitan cities (or urban agglomeration) in the country in 1981, which increased to 23 in 1991.

(V) Cultural Composition of Population :

India is a country of diversities. People belonging to many races and castes reside here. The major races include Dravidians, Mongols and Aryans. Besides these, some people belong to the Caucasian race also. Over time, these races have blended in such a way that their original characters seem to be disappointing and characteristics have started emerging. Even then the Indians are quite diverse this in fact is the major characteristic of this country. Actually the completeness and pride of a culture lies in its diversity. To give respect to other's religion, cultural exchange and interaction are distinct features of Indian culture. The culture of India and blending of races are unique example in the world.

People of in the same religion speak different languages. Languages, races, religions, castes do not follow any boundaries. Despite the racial, religious, linguistics and regional diversities we all are Indians. Our society is a bouquet of mixed cultures. It can be compared with a garden where the flowers of different colours and shades have blossomed, each flower having its unique identity. But a colourful and picturesque scene is created after intermixing of all these diversities.

India is a home to the followers of the Hindu, Islam, Sikh, Christian, Buddhist, Jain and other religions. However, all these religions are equal before the law and they have all kinds of freedom. Every one is given equal rights and have to perform same duties.

Also many languages are spoken in India. Some are of these have originated out of Sanskrit and some from Dravidian. The main languages of India are Assamese, Oriya, Urdu, Kannada, Kashmiri, Gujarati, Tamil, Telugu, Punjabi, Bengali, Malyalam, Sanskrit, Sindhi and Hindi. All these have been accorded constitutional status. The four languages of south India –Tamil, Telugu,



Kannada and Malayalam are Dravidian languages. But it is not that all the people who speak these four languages belong to Dravidian race or the people speaking languages born out of Sanskrit belong to the Aryan race. Find out which language is spoken in a particular different region of India.

Majority of people in India speak Hindi language. Also many people can understand this language even though this is not their mother tongue. Hindi is also the state language of the country. Many linguistic experts are of the opinion that despite the many languages and some external differences in their literature, they have many similarities. All the Indian languages have their own dialect. Structurally, they are almost similar. An interesting feature is that a common all India vocabulary has evolved over time due to the various unifying forces. Many languages do not have much difference even in their scripts. In spite of this, some people use differences in language to divide the people on the basis of language and race for their own vested interests.

We together have to construct a unified, powerful and rich India by following democratic and socialist principles. Fifty –five years have passed since our independence. Our achievements are not less in these 55 years but the country has to find solutions for problems such as social and regional inequalities, unemployment, population growth, etc. by having fast development. Therefore, there is strong need to develop our human resources from all respects as the mental, intellectual and physical in an integrated manner.

(VI) Growth of Population

It is generally said that the population of India is increasing at a very fast rate. Why is it so? We have to think over it. Natural growth rate of population depends upon the difference between the growth rate and the death rate. Higher the birth rate, the higher will be the natural growth rate. Lesser difference between the two will result in the low growth rate. The third element, which affects the growth of population, is migration. The growth rate can be high even if the natural growth is low due to migration. For example both the birth and death rates of urban population are low in comparison to the rural population. But growth rate of urban population is two times more than the rural population. The main reason for this is the large scale migration of people from rural areas to urban areas.

Table 7.5 : India - Growth of Population, 1901-2011

Decade	Birth Rate (Per thousand)	Death Rate (Per thousand)	Natural (Decadal) Growth Rate (Percent)	Annual Growth Rate (Percent)
1901-11	49.2	42.6	6.6	0.6
1911-21	48.1	47.2	0.9	0.09
1921-31	46.4	36.3	10.1	1.01
1931-41	45.2	31.2	14.0	1.40
1941-51	39.9	27.4	12.5	1.25
1951-61	41.7	22.8	18.9	1.89
1961-71	41.2	19.0	22.2	2.22
1971-81	37.2	15.0	22.2	2.22
1981-91	32.7	11.7	21.0	2.14
1991-2001	N.A	N.A	N.A	1.93
2001-2011	N.A	N.A	N.A	1.79

From the above table it is clear that highest birth rate was during 1901-11 decades. Afterwards, it has been gradually decreasing, with some exceptions. The birth rate was lowest (32.7 persons/1000) in 1981-91. On the whole it has recorded one-third decline during the last 90 years. In contrast, there has been a steep decline in the death rate. The death rate has declined from 47.2 per 1000 to only 11.7 persons per 1000 during the last 9 decades. It is therefore obvious that whereas the birth rate is declining slowly, the death rate has recorded a sharp decline. Hence it seems that for arresting the growth rate of population attention is required to be paid on bringing down the birth rate.

The main causes, why death rate has declined sharply is improvement in overall environment along with the expansion in the health facilities. In addition to these, the other main reasons have been: spread of education, changes in the traditional rituals and increasing awareness among people. Now the death rate is at its all time low. Further decline in death rate is expected to be less and very slow. Therefore to check the growth of population we have to lay emphasis on decreasing the birth rate. Greater stress is to be laid upon decreasing the death rate among the poor sections of society where it is still at a higher level. At the same time, we will have to make the people aware of the problems by reducing poverty, unemployment and women illiteracy.

Government is now paying more attention to the programs like improvement in mother –child health care services, women education, women rights and on awareness programs rather than sterilization programs. A family with two children is considered as an ideal family. Thus if we really want to increase the growth rate of the economy, improve the living standard of our people, control the problems of poverty and unemployment, we will have to check the growth of population.

(VII) Education and Health

Education is a key factor for the overall development of the human being. In India, at the time of independence only 14% of the people were literate. The meaning of literacy is limited the activity of writing and reading of one own name. The percentage of literate population has increased 74.4% in the country by 2011 census and it was 52.21 per cent in 1991. In absolute terms, earlier only 6 crore people were literate in our country but now this number has increased to 67.37 crores which means that the percentages of literates has increased by 11 times. But it is important to know that the number of illiterate population has also increased during this period. There were 30 crore illiterate persons in 1951 but after 50 years this number has increased to 35 crores in 2001.

According to the Directive Principles in the constitution of our country, it is the responsibility of the government to provide free education to all of children 14 years age. But even after 66 years of independence, this has become a day light dream. There are many problems also in this regard. It is difficult to provide educational facilities in 5.5 lakh villages spread for and wide in the country. It is a very difficult task to open a school in every village and to convince every parent to send his/her children to school. However, preference has been given to open a school in every village of the country. Now there are more than 5 lakh primary schools in the country. In the year 1951, their number was only 2 lakh. The number of middle schools has also increased by ten times during this period. Earlier, there was one middle school after every 15 primary schools but now there is one middle school after every 4 primary schools. Besides this, some state governments have made the provision of mobile schools and night schools. To encourage education of girls, hostel facilities are being made available to them. But large drop outs in many states is a matter of great concern for the respective state governments. Examples of such states are Uttar Pradesh, Madhya Pradesh, Bihar, Jharkhand and Rajasthan. These states have low proportion of literate population, as compared to the other states. But in contrast, Kerala is a state where the percentage of literate population is highest among all states of the country.

It needs to be added that even today 25 per cent children reach upto the middle (8th) standard in the country. In this way, three –fourth of the children are deprived from the real benefits of education. There is severe shortage of higher and technical education.

As regards the health services, there has been significant expansion in these after independence. Life expectancy has also increased considerably. Health services have also improved due to the development of education and increasing awareness. The per capita consumption of food items has increased with the increase in production of food materials. In 1951, the per capita daily consumption of food grains was 350 grams which has increased to 478 grams (in 1986-87). But due to poor purchasing power, many people in the country, are still not able to get two square meals.

Currently, there is only one hospital for every one lakh of population and only one bed for every 1400 persons in the country. This is not at all an encouraging situation. People living in villages and urban slums are suffering from water borne diseases due to the lack of drinking water. To provide for pure drinking water is a national problem. The government is trying to check this problem under the Rajiv Gandhi National Drinking Water Programme. Fortunately the deadly diseases like chicken pox, cholera, plague which were frequent in earlier times, have been overcome, but the incidence of Malaria in some parts of the country has now become a subject of great worry. There is little possibility of achieving the target of providing proper health facilities to all by the government even after having great improvement in health services.

The population in the country is not only large as compared to the available resources but it is also increasing at the very rapid rate. It is not only important to provide food to the people but also it is important to improve their standard of living. For this, greater stress is also to be laid on the issues like health, education, social services, social security and technical education. Only then the importance of human resources can be enhanced. This valuable feature can be found in an adept citizen, who is an invaluable resource of any country. A highly skilled and qualified citizen has a strong desire and natural instinct to raise his standard of living. This reflects upon the efficient use of the limited available resources. Therefore, so it is very important for us to conserve our environment and limited resources. Our approach towards the environment and resources should be scientific.

EXERCISES**(I) Answer the following questions in brief :**

1. What is the most important and valuable resource of a country?
2. What were the causes of slow increase in population before Independence?
3. What was the population of India in the year 1901?
4. Why the 1921 and 1951 years have been considered as population divides?
5. What is the population of India in the year 2001?
6. What is rank of India in world from the point of view of population?
7. Write the name of the states with highest and lowest population.
8. Name the states which have population more than five crore.
9. What is the population of Punjab in the year 2001 and what is the rank of Punjab from the population point of view?
10. What percentage of population of India lives in Punjab?
11. How much percent of population of our country live in Plains.
12. How much percentage of population of our country live in villages?
13. What is the average density of population in our country?
14. Name the states having highest and lowest density of population.
15. What is density of population in Punjab ?
16. Which union territory has the highest density of population?
17. Name the elements that determine the age structure.
18. What is percentage of population that fall in the 0 – 14 years age group in our country?
19. What is percentage of population fall in the 15 – 64 year's age group in our country?
20. What is the percentage of population that are voters?
21. What do you understand by sex ratio.
22. What are the rural & urban sex ratio?
23. What are the factors that are responsible for the decrease in rural and urban sex ration?
24. What is the sex ratio among the Sikh segment of our country?
25. In which two categories can we divide population of India on economic basis.
26. Which people are called main workers in India.

27. When was the concept of classifying the people as workers and non-workers introduced for the first time in India census?
28. What percentage of labourer is there in rural areas?

(II) Answer the following questions in short :

1. What problems arise due to uneven distribution of population in states?
2. What are the factors that affect the distribution of population?
3. What is the importance of economic structure of population?
4. In how many categories we can divide Main Worker Labourers, name them.
5. Why a percentage of male workers is less than female workers?
6. Why is India known as country of villages?
7. Name the languages spoken in our country.
8. What are characteristic features of regional distribution of population?
9. Which are the states those have high density of population.
10. What are the causes of high density of population in Plains?
11. What are the areas of low density of population?
12. Why population density is high in rice producing regions in India?
13. Why is it necessary to study the structure of population?
14. What is the importance of study of age structure?
15. What are the causes of low sex ratio in India?
16. What are the causes of increase in urban population in India?

(III) Answer the following questions subjectively :

1. Explain the regional structure of density of population in India.
2. Explain in detail the state wise structure of sex ratio in India.
3. Explain the main characteristics of regional structure of distribution of population.
4. What problems are arising due to increase in urban population in metro cities?
5. Write a note on the cultural structure of population of India.
6. Write an essay on problem of population increase in India and also enlighten the solution to this problem.
7. Study critically the efforts being made for the expansion of Education in India.

(IV) Show the following on the map of India.

1. Areas with high density of population.
2. Two state with high literacy.
3. Two states of highest and lowest population.
3. Areas with high growth rate of population.

PART - B
ECONOMICS PORTION

CHAPTER 1

BASIC CONCEPTS

There are some words in Economics which have special meanings. These words are called basic concepts. Some of the basic concepts of Economics are as given below:-

1. NATIONAL INCOME

National income is defined as the sum total of factor incomes viz. rent, wages, interest and profit accruing to the normal residents of a country for their productive services during a definite period of time. Income is a flow. As such it is related to a particular period of time. Normally this period is of one year duration. Thus, National Income is the earned income by the normal residents of a country during one year.

National Product is another term synonymous to National Income. Thus, when we express the result of economic activities as the sum total of market value of final goods and services produced in a country during one year, it is known as National Product. On the other hand, when we express it by the sum total of the factor incomes i.e. wages, rent, interest and profit earned during one year, then it is called National Income.

1.1 Definition

According to Durnberg, "National Income is the net factor income earned by normal residents of a country in the form of wages, rent, interest and profit in one year. This is the sum of domestic factor income and net factor income."

1.2 Example

At the time of calculation of National Income, goods and services are multiplied by their prices. If the quantity of national product is multiplied by the current prices we call it national income at current prices or Monetary Income. Conversely, if the quantity of national product is multiplied with the prices of some fixed period i.e. base year, the result obtained is called National Income at constant prices or Real National Income. Prices keep on changing. As a result of it National income is subject to increase or decrease without any change in the quantity of goods and services. In order to estimate the real economic progress of a country, the national income of different years should be measured at the prices of some particular period of a year. On account of constant prices, real income will only change with the change in quantity of goods and services. When depreciation is included in the national income of a country it is known as gross national income. Conversely when depreciation is deducted, it is known as net national income. When net factor income earned from abroad is deducted

from the national income then the remaining income will be called as the domestic income. Therefore,

$$\text{Net National Income} = \text{Gross National Income} - \text{Depreciation}$$

2. PER CAPITA INCOME

Per Capita income is an important concept regarding the Country's economic welfare or standard of living of the people.

2.1 Definition

Per capita income is defined as the average income earned by the people of a country in a definite period of time.

2.2 Example :-

The per capita income is just an average income. It does not mean that the income of every individual in the country is equal to it. The income of some individuals may be more than it and the income of some may be less than it. For example the per capita income of India in 1994-95 was Rs.8,237 and that of Punjab it is Rs. 68998 in 2010-11.

Per capita income is calculated by dividing the national income by population i.e.

$$\text{Per capita Income} = \frac{\text{National Income}}{\text{Population}}$$

Per capita income at current prices is known as monetary per capita income or at constant prices it is known as real per capita income.

It is not necessary that an increase in the national income of a country will always lead to an increase in the standard of living of the people. Standard of living of the people depends on per capita income. For example, suppose the real national income of a country increases by 4% per annum and there is also 4% increase in population growth, then there will not be any increase in per capita income. It means there is no increase in the standard of living of the people or rate of economic development of the country. Therefore, the rate of economic growth of a country will increase only when there is continuous growth of real per capita income.

3. CONSUMPTION

The word consumption is used in two senses. In the first sense as a process and in the second as an expenditure. In the sense of a noun it is the activity which satisfies human wants directly like the use of water for quenching thirst and use of food for the satisfaction of hunger etc. Thus consumption is that process by which a person uses the utility of a good in order to satisfy his wants. In the expenditure sense consumption means that total expenditure which is incurred on the consumption goods.

Under national income whatever many people spend on the purchase of goods and services for the direct satisfaction of their wants is called consumption or total consumption expenditure. Suppose, the total income of an economy is Rs.2,000 crore, out of which Rs.1,500 crore is spent on the consumption of goods and services, then it will be said that total consumption expenditure of an economy is Rs.1,500 crores and savings are of Rs.500 crores because

$$\text{Income} = \text{Consumption} + \text{Saving.}$$

or 2000 crores = Rs (1500 + 500) crores.

Here, we use the word consumption in the senses of total expenditure.

3.1 Definition

Consumption means expenditure made on consumption during one year in an economy.

3.2 Example

Consumption depends on many factors like income, price of commodity, fashion etc. Thus it can be said that consumption is a function of many factors, means it depends on many factors. Income has the most effect on the consumption. In the words of Keynes, "total consumption expenditure of an economy mainly depends on income". It can be said that consumption is a function of income, which means it depends on income. Generally with the rise in income consumption also increases but increase in consumption is less than that of income. There will be how much change in consumption in comparison to the change in income it depends on the propensity to consume. Propensity to consume is of two types, like

(i) Average Propensity to consume (APC)

The ratio of total consumption to total income is called average propensity to consume. This implies that people will spend how much part of their income on consumption and how much part they save. This is obtained by dividing the consumption by the income or

$$\text{Average Propensity to Consume} = \frac{\text{Consumption}}{\text{Income}}$$

For example when out of the income of Rs.100 crores, Rs.80 crores are spent on consumption then

$$\text{Average Propensity to Consume} = \frac{80}{100} = \frac{8}{10} = 0.8 \text{ or } 80\%$$

This implies that people spend 80% of their income on consumption and they save 20%.

(ii) Marginal Propensity to Consume (MPC)

The ratio of change in consumption to change in income is called marginal propensity to consume i.e.

$$\text{Marginal Propensity to Consume} = \frac{\text{Change in Consumption}}{\text{Change in Income}}$$

For example if income increases from Rs.100 crores to Rs.200 crores then change in income is Rs.100 crores ($\Delta y = \text{Rs.200 crores} - \text{Rs.100 crores} = \text{Rs.100 crores}$)

Let us suppose that on account of change in income consumption increases from Rs.80 crores to Rs.120 crores, than change in consumption is

$$\text{Rs.40 crores } (\Delta C = \text{Rs.120 crores} - \text{Rs.80 crores} = \text{Rs. 40 crores})$$

$$\text{Therefore Marginal Propensity to Consume} = \frac{40}{100} = .4 \text{ or } 40\%$$

This shows that with the increase in income people will spend 40% of it on consumption and save 60% of it. Marginal propensity to consume is more than zero (0) and less than one (1). Rise in income leads to increase in expenditure but increase in expenditure is not as much as there is increase in income. Thus, increase in consumption is less as compared to the increase in income.

4. SAVING

After deducting consumption from income whatever amount remains it is called saving. The difference between income and consumption is called saving like –

$$\text{Saving} = \text{Income} - \text{Consumption}$$

4.1 Definition :

According to keynes, “In fact saving is more than the consumption expenditure. If for example, an economy is generating income worth Rs.2000 crores and its consumption expenditure is Rs.1,500 crores, then saving will be of Rs.500 crores ($\text{Rs.2,000 crores} - \text{Rs.1,500 crores} = \text{Rs.500 crores}$)

Like consumption saving is also a function of income.

Thus, Saving depends on level of income. Generally saving increases with the increase in income and decreases with the decrease in income. The relationship between saving and income is expressed by propensity to save. Propensity to save of two types: (i) Average Propensity to Save (ii) Marginal Propensity to Save.

(i) Average Propensity to Save (APS)

Average propensity to save is the ratio between total saving and total income at a given level of income.

$$\text{Average Propensity to Save (APS)} = \frac{\text{Saving}}{\text{Income}}$$

For example, if income is Rs.100 crores and the saving is Rs.20 crores then Average Propensity to Save i.e.

$$\text{APS} = \frac{20}{100} = 0.2 \text{ or } 20\%$$

(ii) Marginal Propensity to Save (MPS)

Ratio of change in saving caused by change in income is called Marginal Propensity to Save.

$$\text{MPS} = \frac{\text{Change in Saving}}{\text{Change in Income}}$$

If, for example, income increases from Rs.100 crores to Rs.200 crores, it means there is change of Rs.100 crores in income i.e. ($\Delta Y = \text{Rs.200 crores} - \text{Rs.100 crores} = \text{Rs.100 crores}$). Consequently if saving rises from Rs.20 crores to Rs.80 crores then there will be Rs.60 crores change in saving i.e., ($\Delta S = \text{Rs.80 crores} - \text{Rs.20 crores} = \text{Rs.60 crores}$). Therefore,

$$\text{Marginal Propensity to Save (MPS)} = \frac{60}{100} = 0.6 \text{ or } 60\%$$

It indicates that 60% of the income is saved.

5. INVESTMENT

In Economics, "Addition to capital is called Investment." During a year that part of income which is not spent on consumption but is saved for the use of capital formation is called investment. When production is more than consumption during an accounting year, that is called Investment.

5.1. Example

Machines, tools and equipments, raw-materials, rails, roads, buildings, industries means of transport etc. are the examples of investments. Investment is that part of production which is used for further production of goods and services. Investment means, "Increase in real capital which leads to generation of income."

5.2 Definition

According to Prof. J.R. Hichs, "An addition in capital stock is called investment."

5.3. Determinants of Investment

Investment mainly depends upon two factors; one is, rate of profit and the other is, rate of interest. Rate of profit is also called as marginal efficiency of capital.

Every producer compares the rate of profit viz marginal efficiency of capital and rate of interest at the time of investment. He will continue to make investment, till MEC or rate of profit and rate of interest are equal. If the expected profit is greater than the rate of interest, the entrepreneur will increase the investment. On the contrary, if the rate of interest appears to be higher than expected profit, then there will not be any inducement to invest.

5.4 Types of Investment

Investment is mainly of two types:

- (i) Induced investment
- (ii) Autonomous investment

(i) Induced Investment

Induced investment is that investment which depends upon the level of income and profit. It increases with the expectation of rise in income and profit and it decreases with the decrease in its expectation.

(ii) Autonomous Investment

Autonomous investment is that investment which is independent of the level of income. It is not influenced by the expected rate of profit. In fact, it is that investment expenditure which is incurred by the government with a view to promote the level of aggregate demand in an economy, when level of aggregate demand falls short of aggregate supply (resulting in fall in the level of prices and there is reduction in rate of profitability and increase in unemployment) the government intends to push up the level of aggregate demand by way of its own investment – expenditure. Therefore autonomous investment becomes independent of the expectation of profitability and level of income.

In addition to above, there are other types of investments like gross investment and net investment.

(iii) Gross Investment

Total production of capital goods in an economy during one year is called gross investment. This include two types of investments i.e. one is net

investment and other is replacement investment. Replacement investment is that investment which is to be done on the modernisational or replacement due to the depreciation of capital. It maintains the present level of investment. Therefore;

$$\text{Gross Investment} = \text{Net investment} + \text{Replacement Investment.}$$

(iv) Net Investment

Net investment is that investment which results in an increase in capital stock. Deduction of replacement investment or depreciation expenditure from gross investment we can find net investment. Therefore;

$$\text{Net Investment} = \text{Gross Investment} - \text{Cost of Depreciation}$$

In fact net investment results in capital formation.

6. CAPITAL FORMATION

In Economics, that part of income by which more production is possible than before, is called capital formation. The part of income which is not spent on consumption is called saving. If we spend our savings to increase the quantity of capital goods like machines, tools, industries, stock of raw-material or final products etc. then it is called investment. As a result of investment capital goods are produced. An addition to capital stock is called capital formation.

Meaning :- Nowadays, the meaning of word capital formation is taken in two senses:-

(i) Limited Meaning of Capital Formation

According to the limited meaning of capital formation only an addition in the physical stock of physical goods like machines, buildings, industries, raw-material etc is called capital formation.

(ii) Broader Meaning of Capital Formation

According to the broader meaning of capital formation, an addition in the physical stock of capital is not only called capital but it also includes social overhead cost like roads, bridges, rails, canals or increases in human qualities. In fact, the capital formation means addition in the stock of physical and human capital.

6.1 Definition

According to Todaro "Capital formation takes place at a time when part of current income is saved and the same is invested to increase in future income and output. e.g. new industries, machines, tools and raw material etc, promotes physical capital of any nation. Similarly investment in human factors can increase their efficiency".

6.2 Type of Capital Formation

Capital formation can be of two types:-

- (i) Gross Capital formation and
 - (ii) Net Capital formation
- (i) Gross Capital formation means total investment. This includes both net investment and replacement investment or depreciation.
- (ii) Conversely, net capital formation means an addition to net investment. In order to find out net investment, depreciation etc. is to be subtracted from gross investment. In fact, Capital formation means an addition to net investment.

7. DISGUISED UNEMPLOYMENT

In many underdeveloped countries of the world the population growth is more but sources of employment are less. Thus large number of people remain unemployed in these countries. The main occupation of these countries is agriculture. This is the only occupation in which people get some what employment. Due to lack of employment opportunities in other occupations all the members of a family engage themselves to work in agriculture. As a result more people are doing the same work which can be done by few people. Thus unemployment is disguised in this way.

7.1. Definition

When more number of labourers are engaged in a work than actually required for it, then excess workers unemployment is termed as disguised unemployment. Under such a situation less number of workers for work are needed as compared to the more number of workers actually engaged in that work. It means there are some extra or excess workers engaged in that work.

7.2 Example

In underdeveloped countries, due to the lack of employment opportunities in industries and other fields people are doing work in their own family farms. If some of the workers are withdrawn from the agricultural farms, even then total production will not change. Though such people seems to be employed but actually they are disguised unemployed. This can be explained with the help of an example. Suppose any family has a farm of 4 acres. Four members of that family can work efficiently in this farm with the existing methods of cultivation. But if that family has 8 members and due to the shortage of employment opportunities in other fields, all of the 8 workers are employed in that farm, then it will be said that out of these 8 only 4 workers are actually disguised unemployed. But no one from this lot will consider himself as unemployed worker because all the members are doing some what work. Actually they are doing some part of others work. If four out of these workers

are withdrawn from work even then total production will not change. Thus, their unemployment is called disguised unemployed.

8. FULL EMPLOYMENT

Generally full employment is a situation in which no body is unemployed. In reality it is not an appropriate concept. In the full employment situation there are so many kinds of unemployments. According to classical economists the full employment means a situation in which generally all the people get employment who are willing to work at the prevailing rates of wages.

8.1 Definition

As per Prof Lerner, "Full employment is that situation in which all the people who are willing to work at current rates of wages and they get work without any difficulty."

According to Prof Hansen, "Full employment means non-existence of involuntary unemployment."

Involuntary unemployment is a situation when workers are ready to work at current rates of wages but they do not find any work.

Classical economists agree that such a situation is not generally possible but they also agree if there is no involuntary unemployment and other types of unemployments are found even then such a situation will be called full employment.

8.2 Different types of Unemployment Under Full Employment Situation

As per classical economists following types of unemployment are found in the full employment situation.

(i) Voluntary Unemployment

When labourers are not ready to work at the existing rates of wages or are not willing to work on their own will and inspite of the availability of the work then such an unemployment will be called Voluntary Unemployment.

(ii) Frictional Unemployment

This unemployment arises due to the shortage of raw-materials, immobility of labourers, inadequancy of speical kinds of employment opportunities or due to the wear and tear of machinery.

(iii) Seasonal Unemployment

This unemployment arises due to the changes in season, fashion and interests. For examples, ice factories are closed during winter season.

(iv) Structural Unemployment

This unemployment rises due to the structural changes in the economy, like changes due to the exports etc.

(v) Technical Unemployment

This unemployment arises due to the changes in the techniques of production, like when the labourers do not know how to operate new machines etc.

Despite the existence of above mentioned unemployments, if there is no involuntary unemployment than such a situation will be called full employment.

9. INFLATION

According to Dictionary, the English word 'inflation' means 'expansion or Increase'. When air is filled in the bladder of the football, there it gets inflated. Similarly, in relation to price level 'inflation' means constant rise in prices. In Economics, the constant rise in prices is called inflation.

9.1 Definition

- (i) According to Shapiro, "Inflation is a continuous and extreme rise in general price level."
- (ii) According to Peterson, "The specific meanings of inflation is the permanent and continuous increase in the general price level".

9.2 Example

In India, since the end of the First Five Year Plan (1956), the price level is constantly rising. For example, in 1956 the petrol price was Rupee one per litre which increased to Rs. 69/- per litre in 2012. In 1956, the Gold was Rs.100/- per 10 Gms, which increased to Rs. 33000/- per 10 gms in 2012. Inflation rate in 2011 was 9 percent whereas it fell down to 6.6 percent in January 2012.

Inflation can be shown with the help of price index. Price index is that number by which we know that in comparison to a particular year (which is called a base year) how much changes takes place on an average price level during the current year.

There can be many reasons for inflation but the main cause is that demand for goods is more than their supply. When the demand for goods exceeds their supply then prices start increasing and the problem of inflation arises.

10. SUPPLY OF MONEY

Generally money supply means currency and deposits of banks available with the people of the country.

10.1 Definition

Few definitions of the supply of money are given as following:

- (i) According to M.R. Edgmond, "Supply of money means currency and demand deposits available with non-banking public."
 (ii) Following concepts of money supply are given by Reserve Bank of India:

$$M_1 = \text{Currency with Public} + \text{Demand Deposits of Banks} + \text{Other Deposits with R.B.I.}$$

$$M_2 = \text{Currency with Public} + \text{Demand Deposits of Banks} + \text{Other Deposits of R.B.I.} + \text{Deposits of Post Office Saving Banks}$$

$$M_3 = \text{Money with Public} + \text{Demand Deposits of Banks} + \text{Other deposit of R.B.I.} + \text{Time deposits of Banks}$$

$$M_4 = \text{Money with Public} + \text{Demand Deposits of Banks} + \text{Deposits of R.B.I.} + \text{Time deposits of Banks} \\ + \text{total deposits of Post Office Saving Banks.}$$

10.2 Supply of Money in India

Following factors are included in the supply of money in India:-

- (i) Currency Notes and Coins available with public (total amount of deposits in Government treasury, excluding the currency of banks and state co-operative banks).
 (ii) Demand deposits of banks and State Co-operative banks (Excluding inter demand deposits of banks).
 (iii) Amount of other saving accounts of R.B.I.
 (Excluding the deposit amount of the accounts of International Monetary Fund).

10.3 Elements of Supply of Money

The elements of the supply of money are given as follows:

(1) Currency :

It includes those notes and coins which are in circulation. In India, coins are issued by Govt. of India. Coins in the denomination of Rs.10, Rs.5, Rs.2, Rs.1, Paise 50, Paise 25, are in circulation in India. In our country note of Re one is issued by the Ministry of Finance of the Govt. of India and rest of the notes are issued by Reserve Bank of India. Reserve Bank issue the currency note of Rs.1000, Rs.500, Rs.100, Rs.50, Rs.20, Rs.10, and Rs.5 By keeping reserve of gold and foreign exchange worth Rs.200 crores, Reserve Bank can issue the currency notes of any denomination.

(2) Bank Deposit

Bank deposits are of two types i.e. Time deposit and Demand deposit.

Time deposit is for a fixed period of time. Such type of deposit can not be withdrawn with cheque whereas the amount kept in the form of demand deposit can be withdrawn at any time by the will of depositor. Generally supply of money includes demand deposits.

11. GOVERNMENT BUDGET

Every government prepares the detailed account of its estimated revenue and expenditure. It is called Government Budget. Indian Government generally present its budget in Lok Sabha on Feb 28th of every year.

11.1 Definition

Government Budget is an annual statement of estimated revenue and expenditure of the government.

11.2 Types of Budget

The government budget can be of three types:-

(i) Balanced Budget

A balanced budget is that budget in which revenue and expenditure of the government are equal.

(ii) Surplus Budget

Surplus budget is the budget in which revenue of government exceed its expenditure. As a result of it, there is a deficiency in the aggregate demand. Such type of budget is suitable for a situation when there is increase in aggregate demand.

(iii) Deficit Budget

The deficit budget is the budget in which expenditure of the government exceeds its revenue. As a result aggregate demand increase. Such type of budget is suitable when there is a situation of deficiency of aggregate demand.

11.3 Example

Following are the main items of the Budget of Government of India:-

- (a) Items of Revenue :- Corporation tax, income tax, import-export duty, excise duty, central sale tax, interest and income from government enterprises.
- (b) Main Items of Expenditure :- Defence, police, Administration, education, health, social welfare, industry, agriculture, planning, rural development etc. As per proposed budget of 2011-12 govt. of India estimated the revenue of Rs. 7,89,892 crores and expenditure of Rs. 12,57,729 crores.

12. DEFICIT FINANCING

Deficit financing is the method by which government meets the budgetary deficits by taking loans from the Central Bank. Central Bank meets this deficit by printing new currency notes. Consequently money supply increases and prices are expected to rise. Deficit financing is one method to meet the

deficit of Govt. Budget. When aggregate expenditure exceeds aggregate revenue then the government has to face deficit. When any of the following methods is taken in order to meet this deficit, then it is called deficit financing.

- (i) Borrowing from Central Bank by government to meet the deficit. Central Bank gives this loan by printing new currency notes.
- (ii) This deficit is met by taking out the cash balance from government treasury.
- (iii) To issue new currency notes by the govt. other than already issued by the Reserve Bank of India.

By applying the above three methods there is an increase in the supply of money in the country. In India the major portion of the Deficit financing is met by taking loans from the Reserve Bank. Government gives government securities to Reserve Bank in return for taking loans. Reserve Bank prints new notes by keeping government securities in reserve fund and gives loan to the government. In this way, the supply of money increases which results in rise in the price level.

12.1 Definition

According to Dr.V.K., R.V. Rao, “ When the Government deliberately keeps the differences in public revenue and expenditure and creates deficit in the Budget and meets this deficit by such method which increases the supply of money, then it is called deficit financing.”

13. PUBLIC FINANCE

It is the combination of two words i.e. Public + Finance. Public means group of people who are represented by the government and finance means monetary factor. Thus Public Finance means the financial sources of the government i.e. revenue and expenditure. That portion of economics in which the problems of revenue and expenditure are discussed is called public finance. Thus, public finance is the study of the problems of government institutions concerning central, state and local governments. Public finance includes revenue of government i.e. tax, interest, profit etc. Public expenditure includes defence, Administration, education, health, industries, agriculture etc. Public debts are also studied under Public Finance.

The economic activities of the government of the country have also increased with the passage of time. The area of public finance has also been widened. It studies not only the revenue and expenditure of the government but it also studies all economic activities of the Govt. concerning special economic objectives like full employment, economic development, income and equal distribution of wealth, price stability etc.

13.1 Definition

According to Westuble, “ In Public Finance, alongwith the study of income and expenditure of the government administration, their inter-relationship, financial control and management are also studied.”

13.2 Sources of Income of Government

The main sources of income of government are taxes which are of two types:

- (i) Direct tax
- (ii) Indirect tax

(i) Direct Tax

According to Prof. Dalton, “Direct tax is that which is paid by the same person on whom tax has been imposed legally.” For example income tax, gift tax, corporation tax, wealth tax, property tax etc. are the examples of direct taxes.

(ii) Indirect tax

Indirect tax is defined as that form of taxes which are imposed on goods and services. These taxes are imposed indirectly on public.

According to Prof. Dalton, “ Indirect taxes are those which are imposed on an individual but are liable to be paid partly or fully by some other individual. For example Sale tax is an indirect tax. This tax is paid by shopkeepers but whole liability of this tax is shifted on the customer because the shopkeeper charges the sales tax from the customer. The examples of indirect taxes are sale tax, excise duty, entertainment tax, export-import duty etc.

14. PUBLIC DEBT

Every government takes many types of loans in order to meet its expenses. These loans are called public debts. Public debts means all types of loans taken by the government. It include both types of loans taken from internal as well as external sources of a country.

14.1 Definition

As per Prof. Taylor, “Public debt is the loan taken by the government from commercial banks, trading institutions and individuals.”

14.2 Types with Examples – Public debt is mainly of two types:-

- (i) **Internal Debt :-** Internal debts are those debts which can be taken from the public as well as financial institutions within the country. These are obtained in the monetary currency of the country. Its principal and interest are also paid in the currency of the country. Indian government collects internal debts by issuing different types of bonds like Indira Vikas Patra, National Saving Certificates, National Saving Scheme etc.

- (ii) **External Debt** :- External debts are debts which are obtained from foreign and international institutions, foreign banks etc. These are taken in the shape of foreign exchange. The principal and the interest of all these debts are to be repaid in the form of foreign exchange.

15. POVERTY LINE

One method to measure the poverty of any country is the concept of poverty line. The number of people below the poverty line are considered to be poor.

15.1 Definition

The concept of poverty line means that money which is necessary for an individual for the minimum level of consumption. The level of poverty line considered to be equal to that amount which is essential for the survival of an individual to fulfill the minimum monthly requirements. Minimum needs include minimum human necessities of food, clothing, housing, education and health etc. Non-fulfilment of these minimum needs cause lot of sufferings and distress to the human being and as a result there is a loss of their health and efficiency. Consequently, to increase production or to get rid of poverty in future becomes difficult. Poverty and fall in productivity are thus inter-related.

15.2 Extent of Poverty Line in India

With the change in the level of prices the extent of poverty line also changes. Expert Committee appointed by the Planning Commission in 1962 had adopted the minimum consumption level in order to fix the poverty line. As per the committee, those people will be considered below the poverty line whose monthly consumption is less than Rs.20 per month on the prices of 1960-61. In 1968-69, the people getting less than Rs.40 were considered to be below poverty line. According to the above given yardstick, the population below poverty was 17.67 crores and 21.6 in the year 1960-61 and 1968-69 respectively. On account of rise in the cost of living index in year 1976-77, the people were considered to be below poverty line whose income was below Rs.62 in rural areas and Rs.71 in urban areas. In 1977-78 the number of such people in rural and urban areas was 23.9 crores and 5.5 crores respectively.

According to the approach of Sixth Five Year Plan those people will be considered to be below poverty line whose monthly consumption expenditure based on the prices of 1979-80 was less than Rs.76 in rural areas and Rs.88 in urban areas. The number of such people was 26 crore in rural areas and 5.7 crore in urban areas. So 31.7 crore population was living below the poverty line in the entire country. According to the organised group under Sixth Five Year Plan, at 1984-85 prices, an expenditure of Rs.107 per person for rural areas and Rs.122 per person for urban areas was considered to be below poverty line.

According to Seventh Plan, at 1988-89 prices, per month consumption of Rs.152 in urban areas and of Rs.132 in rural areas was considered to be below poverty line. According to the National Sample Survey, at 1993-94 prices, people spending Rs.229 in rural areas and Rs.264 in urban areas will be considered to be below poverty line. In 2009-10 those people will be considered below the poverty line whose daily consumption is Rs 28.65 in urban areas and Rs 22.42 in rural areas.

According to National Income Survey, the number of persons living below the poverty line was 20 crore in 1987-88. In 1993-94, 32 crore people were living below poverty line in the country. This was 36% of the total population. In 1993-94, 35% people in rural areas and 41% people in urban areas were living below the poverty line. So the number of people living below the poverty line is continuously increasing. In 1996-97, 30% of the total population was living below the poverty line. According to the economic survey- 2007-08 26 Crore people are poor in India. More than $\frac{1}{5}$ of poor in world live in India.

In India the number of poor people is different in different states. It is estimated that maximum number of poor people are in U.P., Bihar, M.P. and Orissa. In the year 2009-10, In U.P. 37.7%, in Bihar 53.5%, in Orissa 37% and in Tamil Nadu 17.1% of population is living below poverty line. In Punjab 15.9% population, which means minimum of all other states is living below the poverty line. In Haryana 20.1% and in H.P. 9.5% population is living below poverty line.

16. GROWTH RATE

The economic progress of every economy is explained by growth rate. Growth rate implies that in comparison to a particular year with any other year how much percentage change took place in any economic element e.g. national income, per capita income etc. Growth rate is always expressed in percentages.

16.1 Definition

Growth rate is that percentage rate from which it is known that in comparison to one year how much percentage change has taken place in national income or per capita income in any other year.

16.2 Example

The calculation of growth rate can be made clear with the help of an example. Suppose in 1996 per capita income in India was Rs.8000. This increased to Rs.10,000 in 1997. The growth rate of per capita income can be achieved with the following method:-

$$\begin{aligned} \text{Change in per capita income in 1997 as compared to 1996} \\ = \text{Rs.10,000} - \text{Rs.8000} = \text{Rs.2000} \end{aligned}$$

$$\text{Original per capita income} = \text{Rs.8000}$$

$$\begin{aligned} \text{Per Capita Income Growth Rate} &= \frac{\text{Change in Per Capita Income}}{\text{Original Per Capita Income}} \times 100 \\ &= \frac{\text{Rs. 2000}}{\text{Rs. 8000}} \times 100 = 25\% \end{aligned}$$

∴ Per Capita Income Growth Rate = 25%.

17. FOREIGN AID

In Economics, the term foreign aid is used in wider sense. It includes foreign capital, foreign loan and foreign grants.

17.1 Definition

Foreign Aid means capital investment, loans and grants in any country by foreign govts, foreign individuals, foreign trade organisations, foreign banks and international institutions.

17.2 Types of Foreign Aid

Foreign aid can be received in the following forms:-

- (i) **Foreign Capital :-** By foreign capital we mean investment in the productive activities of any country by the foreigners. Foreign capital can be invested in three ways:-
 - (a) In the first form, foreign capital can be invested in the form of Direct Foreign Investment which means foreign companies can set-up companies in other countries and manage them.
 - (b) Foreign Capital's second form is foreign co-operation, under this foreign and domestic entrepreneurs set-up joint ventures.
 - (c) Foreign Capital's third form is portfolio investment. This investment is done by foreign companies in the shares or debentures of the companies of any other country.

- (ii) **Foreign Loans :-**

Foreign loans are taken from foreign countries, trade organisations and international institutions. The foreign loans which are taken for long time and at low rate of interest, are called soft loans. Contrary to it, those loans which are taken for short period and at higher rate of interest, are called hard loans.

- (iii) **Foreign Grants :-**

Foreign grants are that part of foreign aid which are received from foreign governments and institutions as assistance and which are not to be repaid. No interest is to be paid on it.

18. BALANCE OF PAYMENT

Different countries of the world trade with each other. They trade in goods, services and capital. The goods and services received by a country from other countries are called imports e.g. India imports petrol from Iran. On the contrary, the goods and services sent by one country to other countries are called exports. For example, India exports tea to Iraq. One country has to make payment to other countries for imports and other countries get money for exports. The account of receipts and payments of the govt of one country from other countries during a period of one year is called Balance of Payments.

18.1 Definition

In the words of Kindal Burger, "A country's balance of payment is the chronological record of economic transactions done by the residents of that country with the foreigners."

18.2 Items of Balance of Payment

Items of balance of payment can be divided into two parts"-

- (1) **Items of Current Account** :- The main items of current account are as follows :-
 - (i) Import and export of tangible goods e.g. cloth, machines, tea etc. which are clearly visible. The difference in import and export of these goods is called Balance of Trade.
 - (ii) Intangible or invisible goods e.g. the services given by Insurance companies, banks, doctors, engineers, shipping, foreign travels, govt. transactions, investment, income, charity, gift tax and advertisement etc. are included in the items of current account of imports and exports.
- (2) **Items of Capital Accounts** :- The main items of capital account are private loans, bank capital, govt. capital, import and export of gold etc.

If imports on current account are more than exports then balance of payment is of deficit or unfavourable nature as India's balance of payment is of deficit or unfavourable nature. This deficit is corrected through capital account. This deficit is corrected either by sending gold or foreign currency or by taking loans from foreign countries. If exports are more than imports then balance of payment becomes favourable. As a result of it there is a flow of gold or foreign currency. If exports and imports are equal then balance of payment is favourable. Infact deficit or surplus on current account is balanced through capital account. Therefore, it is said that balance of payment is always balanced.

19. MONETARY POLICY

Monetary policy is that policy through which the govt. of any country or the Central Bank in order to achieve certain objectives controls,

- (i) the supply of money
- (ii) the cost of money or rate of interest and
- (iii) the availability of money

Main aims of monetary policy :- (I) Stability of price (II) Full employment (III) economic development (IV) Stability in Exchange Rate (V) Decrease in economic inequality.

19.1 Definition

According to D.C Austen, “ Monetary policy is related to affect the level and structure of aggregate demand by controlling the rate of interest and the availability of credit.”

19.2 Methods of Monetary Policy

Following are the main methods of monetary policy which are adopted by Central bank i.e. Reserve Bank to control the credit:-

- (i) **Bank Rate :-** Bank rate is an important method of credit control. Bank rate is that rate of interest at which the Central Bank of the country provides credit to other banks. With the increase in bank rate, the rate of interest increases and credit becomes costly. On the contrary, if bank rate declines, credit becomes cheaper. In order to overcome depression the bank rate is lowered. As a result of it, credit creation takes place and there is increase in demand. In order to overcome inflation, bank rate is increased and as a result of it there is credit contraction and there is decrease in demand.
- (ii) **Open Market Operations :-** By open market operations we mean buying and selling of securities in the open market by the Central Bank of the country. During depression central bank purchases securities. As a result of it, there is increase in the direct and indirect cash reserved with the banks. With the increase in cash reserves, there is multiple increase in the accumulated cash balances. As a result of it, there is credit expansion and increase in demand. During inflation, central bank sells the securities. As a result of it, the cash reserve with the banks are reduced. With the reduction in cash reserves, there is multiple decrease in the accumulated cash balances with the banks. Consequently, there is credit contraction and decrease in demand.
- (iii) **Change in Minimum Reserve Ratio :-** All the banks are required to keep a fixed percentage of cash reserves with the central bank. For example, if the minimum CRR is 10% and a bank has cash reserves of worth Rs.100 crores, then it will have to deposit Rs.10 crores with the Central Bank and with the balance of Rs.90 crores it will create more credit. If the CRR is lowered then banks will be able to create more credit which means they will be able to provide more credit. During

the times of depression CRR is lowered and during inflation CRR is increased.

- (iv) **Change in Liquidity Ratio** :- According to this method every bank is required to keep a fixed proportion of its deposit amount in the form of cash. It is called liquidity ratio which means banks can not lend this money. During depression Central Bank reduces this liquidity ratio. As a result of it banks are able to provide more credit. In this way there is credit expansion and there is increase in demand. During inflation Central Bank increases the liquidity ratio. As a result, Banks can give less credit to the public. Thus there is a credit Contraction.
- (v) **Change in Marginal Requirement of Loan** :- By change is margin requirement we mean the difference between the security on loan at the current prices and the amount of loan. For example if a person has given a security worth Rs.100 and if the marginal requirement is 20% then bank can give credit worth Rs.80 retaining Rs.20 as marginal requirement. If the marginal requirement is increased then the public will be able to get less credit and there will be credit contraction. On the contrary, If the marginal requirement is decreased there will be credit expansion. In short, during depression the marginal requirement is decreased and during inflation, marginal requirement is increased.

20. FISCAL POLICY

In the modern age, there has been tremendous increase in the economic activities of the Government. Govt. by bringing changes in its income and expenditure, can affect the aggregate demand to a large extent. The policy related to the government's income and expenditure is called as fiscal policy. The objectives of the fiscal policy are : (i) Economic development (ii) Price Stability (iii) Exchange Rate Stability (iv) Full Employment and (v) Economic Equality.

20.1 Definition

In the words of Dalton, "To achieve the pre-determined objectives, the policy of the govt. regarding income, expenditure and credit is called fiscal policy."

20.2 Method of Fiscal Policy

- (1) **Public Income** :- There are three main elements of public income.
- (i) **Taxes** :- Tax is such a necessary payment which is paid to the govt. according to the law. Taxes are of two types : -
- (a) Direct taxes and (b) Indirect taxes

Direct taxes are those taxes which are imposed on the income and wealth of an individual e.g. income tax, wealth tax and gift tax etc. On the

contrary, indirect taxes are those taxes which are imposed on the commodities. The burden of these taxes is shifted to some other individual. For example, Sale tax, Production tax and Entertainment tax etc.

- (ii) **Public Debt :-** The amount which is collected by the govt. from public as loans is called public debt.
 - (iii) **Deficit Financing :-** Deficit financing is that method with which government meets its deficit by taking loans from the central bank. Central bank gives these loans by printing new notes. As a result of it, supply of money increases.
2. **Public Expenditure :-** The expenditures incurred by the government are called Public Expenditure. These can be of four types:-
- (i) **Public Works :-** The expenditure incurred on the roads, dams and bridges etc.
 - (ii) **Public Welfare Works :-** The expenditure incurred on education, public health etc.
 - (iii) The expenditures on the security and law and order of the country like on Police, Prisons etc.
 - (iv) The expenditure on subsidies given to the producers to increase production, exports and transfer payments.

In this way, Government can control depression and inflation by making changes in public revenue and expenditure.

QUESTIONS

I. Very short Answer Type Questions :

1. Define national income.
2. Define per capita income.
3. What is meant by consumption?
4. Define investment.
5. What is meant by induced investment.
6. What is meant by autonomous investment.
7. What is capital formation.
8. What is meant by disguised unemployment?
9. Define full employment.
10. What is meant by inflation?
11. What is meant by supply of money?
12. What is meant by deficit financing?
13. How many people are considered to be below poverty line in India?

14. What is meant by foreign aid?
15. Define balance of payment.
16. What is meant by fiscal policy?

II. Short Answer Type Questions :

1. Define National Income. What is the difference between National Income and Domestic Income?
2. What is meant by Per Capita Income? How can you estimate Per Capita Income?
3. What do you mean by Consumption? Define Average Propensity to Consume and Marginal Propensity to Consume.
4. What do you mean by Savings? Define Average Propensity to Save and Marginal Propensity to Save.
5. Define Investment. What are the elements of determining the Investment?
6. What is meant by Capital Formation? What is the difference between Gross Capital Formation and Net Capital Formation?
7. Define Disguised unemployment. Explain it with the help of an example.
8. What is meant by full employment? What is the meaning of structural unemployment and Technical Unemployment?
9. What is meant by inflation? Explain it.
10. What is Budget? What are the main components of income and expenditure in the budget of Indian Govt?
11. Define deficit financing? What methods are included in it.
12. What is meant by Public Finance? Explain direct and indirect taxes, with examples.
13. What is meant by Public Expenditure? How many types of public expenditure are possible?
14. Explain the concept of Poverty Line. What are the limits of poverty line in India?
15. Define growth rate. How it can be calculated?
16. What is meant by foreign aid? What are its main forms?

CHAPTER 2

INFRASTRUCTURE OF THE INDIAN ECONOMY

1. INTRODUCTION

Every man as a consumer and producer, for the satisfaction of his wants demands not only goods but services as well. For example, a consumer demands not only food, clothing and housing, radio or refrigerators etc but he demands services like health, education and transport etc. as well. Such services are called consumer services. In the similar way, a producer needs various kinds of services such as transport services to transport raw-material to industries and finished goods from industries to the market, power for the operation of machines, irrigational facilities to irrigate the farms, for increasing the efficiency of labour educational and health services are needed. Such services are called producers services or inputs for the provisions of services both for producers and consumers some facilities like construction of power houses, roads, buses, hospitals and schools have to be created. All such common facilities creating production services are a part of capital stock like the stock of other capital goods such as machine tools, raw-material and goods manufacturing factories.

Thus capital stock is of two types, one which produces goods like factories or machines and the others which provide services like roads, power houses, canals, hospitals and schools etc.

2. MEANING OF INFRASTRUCTURE

The part of the Capital stock of the economy which is necessary from the viewpoint of providing various kinds of services is called infrastructure. In short, infrastructure means those activities, facilities and services which are helpful in the operation and development of other sectors. For example, Roads, Rails and buses offering transport services, canals and dams facilitating irrigation of land and hospitals providing health services are considered as infrastructure.

2.1 Importance of Infrastructure

For the development of every country infrastructure like electricity, transport and means of Communication are of vital importance. This is the first phase of economic progress. Their sufficient quantity means a strong base and their insufficiency is the greatest hindrance in the path of economic development.

In every underdeveloped country there is a need of availability of infrastructure in a sufficient quantity. Lack of infrastructure facilities will create hurdles in the development of industries and agriculture sectors, as a result of it their rate of growth will come down. For example, we daily feel that industrial and agriculture sectors suffer a lot on account of shortage of power. Similarly, if there is a lack of transport facilities then industries will not be able to get raw-material and their finished goods will also not reach the market in time.

Thus, insufficiency of economic infrastructure will bring down the rate of growth of production sectors like industries and agriculture etc. On the contrary, the sufficient availability of economic infrastructure will be helpful in acceleration of their development.

According to World Development Report, 1994, "The sufficient availability of infrastructure will be helpful in determining the success of one country and failure of another, in the diversification of production, expansion of business, solution of the problem of growth of population, reduction of poverty and improving the environment."

Solid base of infrastructure increases production and decreases cost. But its development should be fast and ahead of other sectors development. According to the World Bank, the development and infrastructure has a direct and proportional relationship. This implies that one percent increase in infrastructure will lead to one percent increase in productivity. Some economists like Nurkse, Hirschman etc. call infrastructure as the social overhead cost.

3. ECONOMIC INFRASTRUCTURE

Economic infrastructure refers to that capital stock which offers various types of productive services directly to the producers. For example, country's transportation system like Railways, Roads, Airways provides services to the one part of production and distribution system only. Similarly, Banking System, money and capital market provide services to the other part of industries and agriculture.

Following are main components of economic infrastructure:-

- (i) Transport and Communication
- (ii) Electric Power
- (iii) Irrigation
- (iv) Banking and other Financial Institutions

Now we shall take up their detailed discussion as following :-

3.1 Transport and Communication

Transport system of any country means all the different modes of transport which are used to carry people and goods from one place to the other. These means includes railways, roadways, airways and water transport. Communication means includes post and telegraph as well as services of telephone, radio and television network etc.

3.2 Means of Transport

Means of transport facilitate the movement of goods and people from one place to another. In an economy, which mode to transport will be more appropriate depends upon the nature of economic interdependence between different regions of the country. If different regions of the country are

economically interdependent as were village communities in India, there we need those transport means which are the cheapest for short distance routes. That is why there is a more use of bullock carts, camels, mules and traditional boats etc. as a means of transport in India. If on the other hand, different regions of the country are highly interdependent then we need those means of transport that will cover longer distance with heavy loads as a cheapest and fastest mode. The examples are Railways, Buses, Trucks, Ships and aeroplanes. In order to bring parity between economic development and industrialisation there is a increased tendency of economic interdependence between different regions of the country. Big industries in the country have to bring their raw-material from far-flung areas and to sell their finished products at distant places. Similarly, people have to travel long distances in connection with their business and employment. Thus, modern modes of transport like railways, buses, trucks, ships and aeroplanes are of paramount importance in India. Some of the important means of transport are given as follows :—

1. Railways

Railway is the cheapest means of transport for bringing passengers and heavy materials from the longer distance. The first railway line in India was made in 1853 between Bombay and Thana. Indian Railways is the biggest organisation in Asia and ranks 4th in the world. Total length of the railway track in India is 115,000 kilometers. On an average, almost 20000 trains run every day between 7500 stations transporting about 20 million passengers and 2.8 million tons of goods.

2. Road Transport

Road transport is emerging as another important means of transport in India. There has been a significant growth of roads after independence. This includes trucks, buses, cars, scooters, motor-cycles, cycles, bullock-carts etc. Road transport system in India includes various national highways, state highways, district roads, rural roads and border roads. In different states of India, State Road Transport Corporations have contributed a great deal to the growth of road transport. They have spent a huge expenditure on the development of good buses, Bus Depots, Bus Stands and tourist resorts in order to make the road transport more facilitating and comfortable. The significance of road transport in India is increasing day by day.

3. Water Transport

In India, the third important means of transport is water transport. Among the developed countries, Indian Shipping occupies first position, 2nd position in Asia and 16th position in the world. Water transport is divided into three categories:

- (i) Inland Water Transport
- (ii) Coastal Water Transport

(iii) Sea Transport or International Water Transport

Water transport is facilitated through various harbours (ports) at Mumbai, Kolkata, Haldia, Chennai, Bangalore, Vishakhapatnam. 'Indian Shipping Corporation' and 'Mughaldines' are the two important water transport companies in the public sector in India. Besides, there are many shipping companies in the private sector.

4. Air Transport

It is the fastest but costliest means of transport in India. In India (i) Indian Airlines Corporation, (ii) Air India International and (iii) Vayudoot, are three important public sector undertakings in the area of air transport. Indian Airlines officially merged into Air India on 27 February 2011. On 1st April, 1997, flight operations of Vayudoot were transferred to Indian Airlines and its employees were absorbed into Indian Airlines and Air India. After 1992 various private companies have also entered in air transport sector. In India there are 17 International Airports which are controlled by International Airports Authority of India.

3.3 Means of Communication

Means of communication are to be considered as a part of both social as well as economic infrastructure. Post, Telegraph, Telephone, Radio, Television, Fax, Cinema, Newspaper and Magazines etc. are the important means of communication in India. In the context of economic infrastructure, means of communication give useful information on changes in the market demand and supply situations. On the basis of this information producers, investors and consumers take important economic decisions. It is difficult to take decisions regarding production and distribution without the proper information about demand and supply conditions.

In the context of social-infrastructure, Radio, Television, Newspaper and Magazines play an important role in the spread of education and the knowledge of people. Thus, the means of communication are very vital for every economy.

4. ELECTRIC POWER

Electric power or Electricity occupies very significant place in the economic infrastructure of every country. The quantum of electricity consumed by a country is being considered as the index of its industrialisation and economic development. Prior to independence per capita power consumption was very low in India, but it has shown sustained rise after independence. The increasing consumption of electric power shows more establishment of modern industries and developing nature of the economy.

There are three important sources of power in India :-

- (i) **Thermal Power**
- (ii) **Hydel Power and**
- (iii) **Nuclear Power**

- (i) **Thermal Power :-** Thermal power is generated by the use of coal at thermal power stations. This is the chief source of power generation in India. It constitutes 68% of total power generation in India.
- (ii) **Hydro-Electric Power :-** Hydro-electric power is generated by building high dams on the fast flowing rivers and by moving machines with this water. Development of Multi-purpose River Valley Projects have helped in increasing the generation of hydro-electric power in India.
- (iii) **Nuclear Power :-** India is one of the few countries in the world which have the capacity to generate nuclear power. India has huge quantity of minerals to generate nuclear power but still very less quantity of nuclear power is being generated.

During Five Year Plans, rural electrification has increased manifold. In many states like Punjab, Haryana, Gujarat, Maharashtra, Himachal Pradesh, Andhra Pradesh etc, there is a complete rural electrification. However, still 16% of the villages in India are without electricity. In rural areas, a huge quantity of power is being used to operate pumpsets for minor irrigation purposes.

4.1 Irrigation

Agricultural water requirements can be met in two ways – first by natural means like – rainfall and second through permanent means of irrigation like – wells, tubewells, ponds, canals etc. Significance of these means of irrigation for agriculture purpose is evident from the following factors:-

- (1) **Uncertainty of Rainfall** – In India, rainfall depends on monsoon and monsoon is uncertain. In every four or five years there are draughts and sometimes there is heavy rainfall. Besides, the time of rainfall is uncertain. Sometimes monsoon starts very early and sometimes it starts very late. It is, therefore said that, “Indian agriculture is a gamble of monsoons.”
- (2) **Unequal Distribution of Rainfall** – Distribution of rainfall is highly unequal across different regions of the country. In some regions, there is very high rainfall while in others it is very low. Therefore, in regions of deficient rainfall irrigation has become very significant.
- (3) **Timing or Duration of Rainfall** – In India, duration of rainfall due to monsoon is also very limited. Rains occur largely from July to September. Winter rainfall occur only in states like Punjab, Haryana and Tamil Naidu. Therefore, irrigation is very much essential in order to grow two crops in a year. In India irrigational projects are mainly of two types:-

- (i) **Large Irrigational Projects or Multipurpose River Projects**

Multi-purpose projects are those projects which serve many objectives

simultaneously like irrigation, flood control and generation of electricity. Under these projects dams are constructed to store up the flood water of rivers during the rainy season. Many purposes are served by the sources of stored water like:

- (1) The stored water under this source is brought to the fields for irrigation through canals and water channels throughout the year. So it makes the irrigation possible for whole of the year.
- (2) The electricity is generated when the stored water is thrown from the height of the dam. Electricity is used not only for industries, railways, commercial and domestic purposes but it is also used for operation of pumpsets and tubewells to irrigate the fields.
- (3) Floods can be controlled by making check dams on the rivers. Bhakra-Nangal Projects, Damodar Valley Projects are the notable examples of multi-purpose irrigational projects in India.

(ii) Minor Irrigation Projects

The main projects in minor Irrigation projects include tubewells, wells, power operated pumpsets as well as small catchment areas. These projects are very much important for irrigating water deficient areas.

5. BANKING AND OTHER FINANCIAL INSTITUTIONS

Monetary economic infrastructure in Indian economy means banking system, non-banking institutions, capital market and the controller of all these i.e. RBI (Reserve Bank of India). These monetary institutions are explained in the following ways :-

(i) Money-lender

In India, traditional bankers or money lenders are crediting or debting money from good old times. They charge a very high rate of interest.

(ii) Reserve Bank of India

This is the Central bank of India. It was established in 1935. Its main functions are: to issue currency notes, to acts as a banker of government banks and to regulate and control the monetary system of the country.

(iii) Commercial Banks

Commercial banks occupy an important place in the banking system of India. These banks generally give short term loans. In 1969, 14 Banks and in 1980, 7 more banks i.e., total 21 commercial banks have been nationalised. Nationalisation implies that government of the country has become the owner of these banks. Now the banks are expanding their branches in urban as well as in rural areas. Nationalised banks have given more importance to social welfare along with profitability. These banks offer loans to the poor and backward sections of the society at the low rate of interest.

(iv) Specific Banking Institutions

After independence, many specific financial institutions were established to meet the long term credit requirements of agriculture, industry and foreign trade. For example, Industrial Development Bank of India, Indian Industrial Finance Corporation and small Industries Development Bank etc. were established to meet the credit requirements of the industrial sector. For agricultural sector, credits are offered by Co-operative societies, Rural Agriculture Banks, Land Development Banks and National Agriculture and Rural Development Bank (NABARD). Import-Export Bank is established to give financial help to foreign trade.

(v) Non-Banking Financial Institutions

These are those financial institutions which raise money from the public and other sources and offer loan of that money or make investment. However, these institutions do not deal in the routine banking functions such as withdrawal of money through cheque system, issuing the draft and discounting the bills of exchange etc. Unit Trust of India and Life Insurance Corporation of India are the two notable examples of non-banking financial institutions in India.

(vi) Stock-Exchange

These are those institutions which deal in the sale and purchase of shares and debentures of companies. All these institutions are also called share markets.

In short, in the economic development of the Indian Economy, the financial infrastructure such as education, health and housing, and economic infrastructure such as transport, irrigation, power, banking etc. play a very significant role.

6. CONSUMER EXPLOITATION AND PROTECTION

The modern era is an era of consumerism. A variety of new goods are supplied in the market daily for the utility and comfortability of the consumers. New food products, new fashion garments, decorative items, household gadgets, new means of transport, modern means (equipments) of entertainment like – coloured television, video etc. are being invented and produced continuously. Advertisements and publicity are being used at large scale to introduce or to make available these goods to the consumers. Now a days a consumer chooses his consumption material on the basis of attractive advertisements and publicity of different producers. In this way, they are exploited in many ways. To protect the consumers from such type of exploitation, Consumer Protection Measures have been started.

6.1 Consumer Exploitation

In modern Indian Economy, consumer is the most confused and unorganised person. Trading classes are putting their all out efforts to exploit the consumers. Adulteration, sub-standard packed goods, use of non-standard

weights or misleading and fabricated advertisements and unfair Monopolistic and Restricted Trade Practices (MRTP) are such activities which exploit the consumers in a large extent. Guarantee and warranty of durable goods like – refrigerator, television, air-cooler, washing machines and means of transport seems to be an imagination. Traders do not care for their promises and guarantees but they try to get rid of their responsibilities. According to a Judge of Madras High Court, “Consumers have to pay high rates of freight for unhygienic rail wagons and insanitary conditions of rail-toiletries. They have to foot the bills of telephones without getting any service from them. They have to drive their vehicles on risky roads. Pedestrians do not find any footpaths. Postal services (Dak or letters) do not reach in time. They have to eat adulterated food. They have to drink polluted water and breathe in poisonous air. In spite of the monopoly of Government on goods and services, inadequate supply of essential goods and public services like power, transportation, communication and banking services are uncountable examples which explain the tragic story of the consumers.

Producers and traders exploit the consumers in many ways such as:-

- (i) Mis-information regarding quality of the product,
- (ii) Adulteration,
- (iii) Use of non-standard weights and measures,
- (iv) Supply of sub-standard products,
- (v) Non-fulfilment of the sales guarantees,
- (vi) No timely supply of goods, even after taking the advance.

6.2 Meaning of Consumer Protection

Consumer protection means the protection of the buyers of consumers goods from the exploitation of the unfair trade practices of the producers.

6.3 Methods of Consumer Protection

To protect the interests of the consumers and small producers from the monopolists and big producers, ‘Monopoly and Restrictive Trade Practices Act’ was passed in 1969 in India. This led to the establishment of Monopoly and Restrictive Trade Practices Commission. This commission check the malpractices of big producers such as to increase the price by creating scarcity of the good in the market, to decrease the quality of the goods and to stop the competition etc. In 1991, by making changes in this Act for checking unfair trade practices it was made more effective than before. However, the main limitation of this act is that it does not protect the consumers from the exploitation by medium and small scale industries and traders.

For protecting consumers interests from all categories of producers, ‘Consumers Protection Act, 1986’ was passed and this act came into force from 1987. This act covers all goods and services other than those specifically exempted

by the central government. All public, private, joint and co-operative enterprises come within the purview of this act. In accordance with this act, in order to redress the grievances of the consumers at very low expenses and for their early disposal, 'Consumers Disputes Redressal Forums,' have been established at the (i) district (ii) state and (iii) national levels. Along with this, 'Consumer Protection Councils' have also been established to protect the interests of consumers at the central and state level.

6.4 Main Features of Consumer Protection Act, 1986 –

The main features of Consumer Protection Act, 1986 are as follows :-

- (1) **Scope** – All sellers of private, public and co-operative sectors come within the purview of this act.
- (2) **Simple and Inexpensive Redresses** – This act offers simple and inexpensive redressal to the consumers' grievances. The complainant need not engage any advocate. He has to lodge his complaint in writing, mentioning the name and address of the party against whom the complaint is being lodged.
- (3) **Three-Tier Grievances Redressal Machinery** – Under this act in order to solve the problems of consumers a three-tier machinery has been set up :-
 - (i) **District Forum** :- This forum decides the complaints the value of which is less than Rs. 5 lacs.
 - (ii) **State Forum** :- These forums decides the complaints involving an amount which is between 5 lacs and 20 lacs.
 - (iii) **National Forum** :- This forum decides complaints which are more than 20 lacs in value.
- (4) **Complaint** :- Consumer can lodge the following type of complaints within two years from the date of the purchase of the good in case:
 - (i) He has to suffer a loss because of the unfair trade practice of the trader.
 - (ii) There is any defect in the purchased goods or services.
 - (iii) The trader has charged more than the written price or the price fixed by the government.

6.5 Consumer Education

To protect the interests of the consumers, it is very much essential to educate them. It is with this view that the consumer's week is celebrated throughout the country between March 15 and March 21 every year. During these days more stress is given on awareness among the consumers regarding their rights. The occasion is marked by various exhibitions, Seminars and street plays. Consumers are apprised of the possible unfair trade malpractices of

short-weights and measures, adulteration and the like. To arouse awareness among the consumers publication of 'Upbhokta Jagran' (consumer awareness) was launched in 1991. Central Consumer Protection Council has been established by the Central government. Similarly at state level, State Consumers Protection Councils have been set-up. In fact, the importance given to the consumers protection is a significant sign towards economic progress.

6.6 Consumer Organisation

Today, there are about 500 consumer organisations. These organisations have contributed a lot to protect the interests of the consumers some of these organisations are :

- (1) Consumer Direction Society, Mumbai.
- (2) Consumer Action Forum, Kolkata.
- (3) Citizen's Forum.
- (4) The Voice, New Delhi.
- (5) Mumbai Customer Panchayat System etc.

7. PUBLIC DISTRIBUTION SYSTEM

The Government of India tries to distribute the necessities of life like wheat, rice, sugar, kerosene oil, cloth etc. to the poor people of the country at low prices. To meet this objective, Public Distribution System, has been set-up.

7.1 Definition :- Through Public Distribution System Government distributes the necessities of life like foodgrains, sugar, kerosene, coarse cloth etc. at concessional prices through Fair Price shops at fixed quantity to the general public especially to the poor sections of the society.

7.2 Necessity :- The need of Public Distribution System was felt because market forces of demand and supply could not distribute the necessities of life like foodgrains, sugar, kerosene, coarse cloth etc. from the social point of view. The effective forces of demand and supply are responsible for the following causes :-

- (1) Inadequate Production:- In India the supply of essential commodities of life is less than demand because of three reasons:-
 - (a) Inadequate Production,
 - (b) Lack of warehouses and selling facilities,
 - (c) Hoarding which results like speculative and black marketing evils.
- (2) Poverty :- Poverty ridden consumers are less expected to purchase essential goods at market price. As a result of it the problems of starvation and mal-nutrition are expected to arise.

7.3 Constituents of Public Distribution System

There are three constituents of Public Distribution System in India:-

- (i) **Procurement at Minimum Prices :-** Government of India procured the foodgrains at the prices fixed on the recommendations of the commission for Agricultural costs and prices. If the market prices fall below these prices, then the government itself purchases the produce of farmers at these fixed prices. This process is called procurement of grains. This ensures the farmers about the complete knowledge of the prices for his produce and he does not reduce his production for fear of fall in the prices. In 1988, the government procured 140 lakh tons of foodgrains at the fixed prices. In 1996-97 this procurement increased to 167 lakh tons and this increased to 555.08 lakh tons in 2009-10.
- (ii) **Buffer stock :-** The second component of Public Distribution system is to keep the stock of necessary items like foodgrains and sugar etc. by the government. This stock is called Buffer Stock. For the safe storage of these stocks enough arrangement of godown has been made. When there is shortage of food grains, the government releases the supply from the buffer stock and thus check the prices from rising.
- (iii) **Fair Price Shops :-** The government has opened about 5 lakh Fair Price Shops to distribute the essential commodities at low prices through Ration Cards. On these shops, the quantity of the commodities available to the people at the reasonably fixed prices has been fixed by the government which means Rationing has been done. In 1988, 180 lakh tons and in 1996-97, 190 lakh tons of goodgrains were distributed through these fair price shops. Besides foodgrains, these fair price shops also distribute sugar, kerosene, coal and coarse cloth. Every Fair Price Shop serves population of about 2000.

For the distribution of goods like tea, soaps, cereals and Iodised salt to the population living in hilly and draught areas, a new scheme has been started. It is called Improved Public Distribution System. Under this system, Food Corporation of India supplies the foodgrains at special concessional prices to different states and Union Territories. Under this Public Distribution System the fixed price is reduced by 50 paise per kilogram.

QUESTIONS

I. Very Short Answer Type Questions :

1. What is meant by infrastructure?
2. What are the main components of economic infrastructure in India?
3. Name the various modes of transport in India?
4. What do you mean by irrigation?

5. What are the major sources of irrigation in India?
6. How many Banks are Nationalised?
7. Write the name of Central Bank of India?
8. Which are the major Banking Institution in India?
9. What do you mean by consumer protection?

II. Short Answer type Questions :

1. What do you mean by infrastructure? Why is it required?
2. What are the main kinds of infrastructure in India?
3. What are the main monetary institutions of India?
4. What do you mean by consumer exploitation? What are the main methods of consumer protection?
5. What do you mean by Public Distribution System? Explain the present position of Public Distribution system in India.

CHAPTER 3

AGRICULTURAL DEVELOPMENT IN INDIA

1. INTRODUCTION

India is considered to be an agrarian economy because 68 % of its population is still dependent on agriculture for livelihood. After Independence Indians inherited a backward agricultural economy from the Britishers. Mahatma Gandhi considered agriculture as "Soul of India". In this context Nehru had also said, "Agriculture needs utmost priorities." Emphasising the importance of agriculture Dr. V.K.R.V. Rao said, "If the vast mountain of development is to be crossed under Five Year Plans, then the targets fixed for agriculture will have to be achieved". In the words of eminent Indian scholar Dantewale, "For the economic development of Indian economy, success in the field of agriculture leads the country to the path of economic progress".

2. MEANING OF AGRICULTURE

The term "Agriculture" in English language is derived from two words, 'Agri' means field and 'Culture' means cultivation. Webster Dictionary states, "Agriculture is the art or science of production of crops and livestock on a farm".

3. IMPORTANCE OF AGRICULTURE IN INDIAN ECONOMY

Planning Commission has rightly said, "Development of agriculture is most essential for the success of the plans. Growing population of India depends on agriculture for food. Industry, commerce, foreign trade and transport of the country depend entirely on Indian agriculture." Importance of agriculture to the economy of the country is clear from the following factors :-

(1) Contribution in National Income

About 40% of national income of India comes from primary sectors like agriculture and forestry etc. During the period of planning, share of agriculture in the national income has been ranging between 51% and 29%. As compared to the other sectors like industry, trade etc. the share of agriculture in India's national income is very large, although it is gradually diminishing. In the developed or rich countries of the world, agriculture is fairly developed but its percentage contribution to the national income is very small.

2. Source of Food Supply

Agriculture provides food to population and fodder to livestock in India. Therefore, agriculture is a source of subsistence for men and animals. With the progress of agriculture, food problem of the country has been solved by and large. A healthy individual should get 750gms of food grains per day. In India availability of milk, eggs, fish etc. is very little. Hence the need of cereals is

much. Indians get small quantity of vegetables, pulses and edible oils. Their average availability should be 25.5gms per person but it is only 14.6gms. In this respect Freeman has rightly observed, "Our progeny might say satirically that their ancestors in the 20th century reached the moon successfully but failed to provide bread and butter to its children."

3. Agriculture and Employment

In Indian Economy, the maximum employment opportunities are available in the agriculture sector. According to the 1951 census, the contribution of rural workers to working population was 80%, out of which almost 82% rural workers were getting employment from the agriculture sector. It can be said that in accordance with 1901 census, the 60% of population was engaged in agriculture sector, whereas in 1996-97 only 64% population was getting employment from agriculture. India's two-third of population is dependent on agriculture sector for employment. According to 1991 census, there were 22 lakh people who were working as cultivators and 12 lakh people working as landless agricultural labourers. Thus, inspite of backwardness in agriculture sector and poverty in rural areas, the main source of employment is agriculture in India. According to Economists, in India, industries specially large scale industries are not expected to create more employment oppurtunities in near future. Thus agriculture will remain a source of employment not only in present but also in future in India.

4. Agriculture and Industry

In an underdeveloped country like India, in the early stage of economic development, agriculture plays an important role in the industrial development because of the following reasons:-

- (i) Industries get raw materials like cotton, jute, sugarcane, oilseeds, rubber, foodgrains etc. from agricultural sector.
- (ii) With the increase in productivity of agriculture, income of people goes up and they are in a position to demand more of industrial goods.
- (iii) As a result of increase in the productivity of agriculture, demand for labour in agriculture sector will fall, and that labour force will be able to work in industries.
- (iv) Because of Industrial development, income will rise and with the increase in the demand of foodgrains, agriculture will also develop.
- (v) Many cottage industries like oil expellers, handlooms etc. depend upon agriculture for raw material.

5. Source of Livelihood

Agriculture is the main source of livelihood of Indian farmers. Agriculture in India is also a source of livelihood for non-agricultural rural families like weavers, artisans, barbers, washermen etc. Large number of rural families also

depend on agriculture as their subsidiary occupation.

6. **Agriculture and Foreign Trade**

In the foreign trade of India, agriculture plays an important role. The contribution of agricultural products in India's total exports is very large. Large quantities of Tea, jute, cashewnuts, tobacco, coffee, spices etc. are exported from India.

7. **Internal Trade**

Large number of Indians spend more than 80% of their income on foodgrains, tea, sugar, milk etc. Thus, agriculture is of great importance to the internal trade of the country. Foodgrains trade provides employment to large number of people and revenue to the government by way of taxes.

8. **Transport**

Means of transport like railways, motors, bullock-carts etc. earn large part of their income by carrying foodgrains and agricultural products from one place to the other.

9. **Government Income**

State Government earn large part of their revenue from agriculture. Many taxes are imposed on agriculture, e.g. land revenue, irrigation charges, agricultural income tax etc.

10. **Capital Formation**

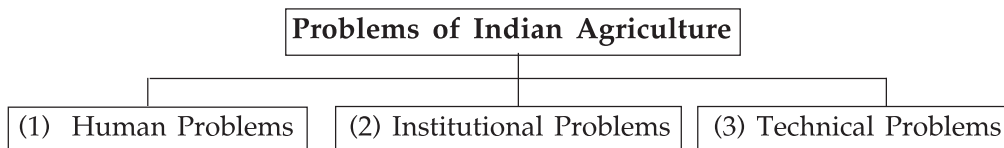
Good deal of Country's capital is invested in agriculture. From the point of view of fixed capital investment, agriculture sector occupies the first place. Capital worth millions of rupees is being invested in the means of irrigation, livestock and tools, tractors etc.

It is clear from the above account that "The prosperity of the farmers is the prosperity of India." Development of agriculture is also necessary for the success of economic planning.

4. **MAIN PROBLEMS OF INDIAN AGRICULTURE**

Indian agriculture is quite backward. It has to face so many problems. The problems of Indian agriculture can be divided into three categories:-

1. Human Problems;
2. Institutional Problems; and
3. Technical Problems



4.1 Human Problems

1. **Pressure of Population on Land** :- Heavy pressure of population on agriculture is one of the principal causes of backwardness of Indian agriculture. In 1901, the number of dependents on agriculture was 16 crores 30 lakhs. Now it has increased to 38 crores and 30 lakhs. As a result of it the availability of land per individual which was 0.43 hectares in 1901 has been reduced to 0.23 hectares. Now the pressure of population on land has resulted in the problem of subdivision and fragmentation. With this problem, disguised unemployment has increased.

2. **Social Atmosphere** :- In India the environment in rural area has been a great obstacle in the development of agriculture. Indian farmers are illiterate, so they are unable to adopt the knowledge of latest modern techniques of agriculture easily. Indian farmers are fatalist, superstitious and conservative. They are in the grip of casteism. On account of ignorance and casteism, Indian farmers are used to fight on petty issues and engaged in litigations, by which lot of time and money is wasted. This social environment of villages is proved to be a great hurdle in the development of agriculture.

4.2 Institutional Problems

(i) **Small size of Holdings** :- Most of the farms are very small in India. The average size of farms is 2.3 hectares. In Punjab the average holdings is of 3.77 hectares. About 70% farms are even less than 2 hectares whereas in America the average holding is of 122 hectares. In India, the farms of a farmer are not only small but also scattered due to fragmentation. Due to the small size of farms it is very difficult to adopt scientific methods of cultivation. This makes the animals, tools and means of irrigation as useless.

(ii) **Land Tenure System** :- The major reason for backwardness of agriculture is land tenure system. Although in post-independence era Zamindari system has legally been abolished, yet the condition of the cultivator is not satisfactory. He has to pay high rent. Land owners deal with him in an arbitrary manner. They evict the tenant at their discretion. Under such circumstances increase in agricultural productivity can not be expected from the cultivators.

4.3 Technical Problems

(i) **Inadequate Irrigational Facilities** :- Indian agriculture depends largely on rainwater. Due to uncertainty of rainfall, agricultural production also becomes uncertain. That is why Indian agriculture is called a "Gamble in Monsoon". Hardly 34% of cultivated land has been covered by permanent means of irrigation during the period of planning. Owing to lack of irrigation facilities farmers are able to grow only one crop in a year.

(ii) **Old Agricultural Implements** :- Old type of implements are still used in cultivation in India. In this scientific age, Indian farmers are using agricultural implements and tools such as wooden plough, sickle, hoe, spade, etc. There is

very nominal use of tractors and other modern machinery. Due to the use of old tools and implements in cultivation the productivity of land does not increase which results in low agricultural production.

(iii) Traditional Technique of Cultivation :- In India the techniques of cultivation are traditional. Crop-rotation is not practised properly. Consequently due to this and other reasons agricultural production decreases a lot.

(iv) Lack of improved seeds :- Indian farmers do not make judicious use of better quality seeds. First reason is that, they do not understand their importance; secondly, their supply is not well-organised in the country; thirdly, good variety of seeds being costly, the poor farmers can ill-afford them. Hence due to these reasons productivity per hectare is low.

(v) Lack of Manure :- Manure plays an important part in good cultivation. Indian farmers do not make use of it in proper quantity. About 60% of cow dung, which is very cheap and suitable as manure, is used as a fuel. Chemical fertilizers are expensive and are imported from foreign countries. Its use, therefore, is restricted.

(vi) Defective Agricultural Marketing System :- The Marketing System of agricultural production is far from satisfactory. As a result, the farmers do not get proper price for their produce. For want of efficient means of transport, the farmers are compelled to sell their produce to the village money-lenders who pays a very low price. On account of inadequate storage facilities, farmers have to sell their produce immediately after harvest, when the price of produce is minimum. This has to be done because farmers do not have godowns for storage of their produce.

(vii) Diseases of Crops and Attacks of Pests :- Crops are destroyed in large quantities by crop diseases, monkeys, rodents etc. Insects and locusts also play havoc with standing crops. According to Sh. N. Singh, Soil Conservation advisor to Govt. of India, "Every Year Crops worth Rs.100 crores are destroyed by the insects in India."

(viii) Lack of Credit Facilities :- Poor farmers in India face lot of difficulties in getting loans. They do not get sufficient credit at proper time from banks and co-operative societies. Even now they have to depend upon creditors and money-lenders especially for consumption loans. Farmers have to pay a large part of their income to money-lender in the form of interest. The farmer is compelled to sell his produce to money-lender at throw-away prices.

(ix) Weak Cattle :- Because of the lack of agricultural machinery cattle play an important role in Indian agriculture. But Indian cattle are weak and their mortality rate is also very high. Farmers have to keep many heads of cattle. Due to this on the one hand, they have to spend more and on the other hand, expenses on their upkeeps rises. Hence, cost of agricultural production increases.

In short it can be said that three types of factors i.e., human, institutional and technical are responsible for low agricultural productivity and backwardness of agriculture in India.

5. ROLE OF GOVERNMENT IN AGRICULTURAL GROWTH

Government of India has played the following important role in the development of agriculture.

(1) Land Reforms :- After independence, Government has introduced several significant measures relating to land reforms like:

- (i) Abolition of Zamindari System.
- (ii) Acts have been passed in different states to improve land tenure system by providing ownership rights to the cultivators.
- (iii) Maximum ceiling on land holdings has been fixed.
- (iv) Till 1996, Consolidation of Holdings was completed on land measuring 619 lakh hectares in the whole country. "Consolidation of Holding is an activity by which farmers are asked to get land of the same size and kind at one or two places in lieu of their small and fragmented Holdings-scattered at many places."
- (v) Co-operative farming has also been developed.
- (vi) To improve the lot of landless Cultivators, Acharya Vinoba Bhave had started the Bhoodhan Movement.

Thus, land reforms have contributed significantly in the development of agriculture production.

2. Increase in Area Under Cultivation

During Five Year Plans, efforts have been made for the development of agricultural sector. During the period of planning, area under cultivation has increased by 38%. In 1950-51, total sown area was 13 crores hectares, now it has gone up to about 18.5 crore hectares. In order to increase the net sown area, barren and waste land has been made cultivable in Punjab. Lands rendered uncultivable for the whole year has been reduced. Efforts have been made to cultivate the land wasted due to soil erosion. In the area covering about 4.2 crore hectares, more than one crops are being sown every year.

3. More Irrigational Facilities

In order to increase the productivity of agriculture, irrigational facilities have been expanded. Several major and minor irrigation projects were launched in the country. In 1951, hardly 17% of total land was covered by irrigational facilities which has now extended upto 34% of land. In Punjab, facilities of irrigation are available to 95% of area under agriculture. With coming up of Multi-Purpose Projects and tubewells area under irrigation has increased considerably. Areas where irrigational facilities are not possible, dry farming techniques have been introduced. In the year 1995-96, irrigation for 876 lakh hectares could be possible. In Punjab the facility of irrigation is available for 73 lakh hectares of land. Total expenditure on irrigation in Seventh Plan amounted to Rs.16,590. In Eighth Plan, a sum of Rs.32,280 has been spent and now irrigated area has increased to 894 lakh hectares.

4. Reforms in Delivery system

Government has made many reforms in distribution and marketing of agricultural inputs and output. Emphasis has been made on the establishment of Co-operative societies in order to provide the essential agricultural inputs like – improved seeds, manure etc., to the farmers. In this regard, the required credit was made available to the farmers through the organised sector like co-operative societies, Regional Rural Banks, commercial Banks etc. Its purpose is to protect the farmers from the exploitation of money-lenders. In order to enable the farmers to get fair price of their agricultural produce and to protect them from the exploitation of traders and money-lenders and for bringing improvement in the agricultural policy, Regulated Markets, Co-operative Marketing Societies, other Government Organisations like Food Corporation of India, NAFED, MARKFED, HAFED have been set up. These institutions are mainly performing the work of agricultural marketing and processing of agricultural produce keeping in view the welfare of the farmers.

5. Agricultural Research And Development

Indian Government has established many institutions, schools etc. for agricultural research and development. Indian Council of Agricultural Research (ICAR) is the most prominent institute among all agricultural research institutes of the country. This institute has branches all over the country. In India 27 Agricultural Universities have been opened. These institutes have made research for improved seeds of wheat, Rice and many other crops. The farmers have been educated about the improved techniques of agriculture. Scientific methods have been invented for farming in dry areas.

6. Development of Agricultural Land

During five year plans, many efforts have been made for the development of agricultural land. Arrangements have been made for levelling of land, sloping of land, contour bunding, terracing of land etc. in order to conserve the soil.

7. Improvement of Animal Husbandry

During five year plans, key village schemes were introduced with a view of improving the breed of the cattle. To treat the cattle diseases, veterinary hospitals have been set up. To develop cattle wealth of the country, 86 Intensive Cattle Development Projects (ICDP) have been set-up. All the development measures for cattle are adopted in these projects.

8. Improvement in Agricultural Marketing

Main objective of improving marketing of agricultural produce is to ensure reasonable price to the farmers for their produce. Measures have been taken especially in two directions in this regard.

- (i) Regulated markets are managed by the market committee appointed by the Government. Their objective is to protect the farmers from the

exploitation by the middlemen. In such markets, metric system of weights and measures is used. By 1996, as many as 6969 mandis have been regulated. There are 144 regulated markets in Punjab.

- (ii) Co-operative Marketing Societies have also been established for improving agricultural marketing. These societies sell the produce of their members at reasonable prices. They make arrangements for cheap and quick means of transport and also for grading of the produce. These societies provide facilities of godowns and warehousing. In 1996-97, the co-operative marketing societies have marketed agricultural products worth Rs.9503 crores.

9. Proper Agricultural Price Policy

Government has made significant contribution in agricultural development by introducing the Proper Agricultural Price Policy. Government has opened many institutions. In order to provide the farmers the stable prices and profitability of their produce and to implement the Guaranteed Agriculture Price Policy, the Government has established many institutions like Agriculture Cost and Price Commission. This commission advises the Government about the agriculture price policy. The minimum support price and cost price of agriculture goods are also decided by this commission. The second purpose of the Government's price policy is to set-up the Food Corporation of India keeping in view the protection of the interests of the consumers. This corporation buys the foodgrains at the minimum support price fixed by the Government and keeps that in the buffer stocks. When the prices of foodgrains start rising, then the Government sells the foodgrains at a reasonable price in the market out of this buffer-stock. In this way, the rise in prices is regulated. Government also fixes the maximum prices of many agricultural products. The Government sells many agricultural products like grains, sugar, oil etc. through the Fair Price Shops under Public Distribution system.

10. Agricultural Trade Policy

There are two main aspects of Indian Agricultural Trade policy :-

- (i) Regarding foodgrains the agricultural trade policy is the policy of Import Substitution. It means that, Governments' policy is to produce the foodgrains within the country rather than to import it.
- (ii) Regarding cash crop like – cotton, Jute, Tea, Coffee etc., the agriculture trade policy is the policy of Export Promotion. Government is very much encouraging the export of cash crops. Agricultural trade policy of the Government has a positive effect on agricultural development.

11. Credit Facilities

Co-operative credit societies have been developed to provide adequate credit facilities to the farmers at low rate of interest. Number of Land Development Banks has increased. At present, there are 82,000 Primary Agricultural Credit Societies and 1,440 Primary Land Development Banks functioning in the country. After nationalization, commercial Banks have been giving liberal loans to agriculturists. Regional Rural Banks and Farmer's Service Societies have been established to provide credit facilities to the farmers. On 12th July, 1982, National Bank for Agricultural and Rural Development (NABARD) was established to grant huge loans for agricultural development. In 1996-97, different institutions provided credit worth Rs.28,817 crores to agricultural sector. In Punjab, there are about 4205 Agricultural co-operative Societies which have been given loans worth Rs.852 crores.

12. Agriculture and Five Year Plans

In the Five Year Plans, about Rs.23,500 crores have been incurred on agricultural development. As a result of it the foodgrains production has doubled than earlier. Progress achieved in the agricultural sector during different Five Year Plans period is mentioned as follows:-

1. **First Plan (1951-56) :-** During this plan, Rs.290 crores were spent on the development of agriculture. Foodgrains production increased to 693 lakh tonnes.
2. **Second Plan (1956-61) :-** During the second plan, an expenditure of Rs.549 crores was incurred on the agricultural development. Consequently, foodgrains production went upto 823 lakh tonnes.
3. **Third Plan (1961-65) :-** Development of agriculture involved on expenditure of Rs.1,089 crores during this plan. But due to several causes production of foodgrains fell to 723 lakh tonnes.
4. **Fourth Plan (1969-74) :-** In the fourth plan, expenditure on agricultural development amounted to Rs.2,320 crores and production of foodgrains increased to 1,047 lakh tonnes.
5. **Fifth Plan (1974-78) :-** During Fifth Plan, Rs.4865 crore were spent on agricultural development. As a result, production of foodgrains increased to 1320 lakh tonnes.
6. **Sixth Plan (1980-85) :-** In the Sixth plan, Rs.6,623 crore were spent on the development of agriculture. The production of foodgrains increased to 1,465 lakh tonnes.
7. **Seventh Plan (1985-90) :-** An outlay of Rs.12,792 crore was spent for the development of agriculture in this plan. The foodgrains production rose to 1,760 lakh tonnes.
8. **Eighth Plan (1992-97) :-** In the Eighth Plan, there was a proposal to incurr Rs.22,280 crore on development of agriculture, Rs.35,263 crores

on rural development, Rs.6837 crores on special regional programmes and Rs. 33,280 crore on irrigation and flood control. In this way, the target was to spent 22% of total expenditure on the development of agriculture sector. The main objective of this plan was to increase the agricultural production through agricultural development and diversification, in order to attain the goal of self sufficiency in food products and export of agriculture products. In the Eighth Plan, the target was fixed to produce 2100 lakh tonnes of food grains, 2750 lakh tonnes of sugarcane, 140 lakh bales of cotton and 95 lakh bales of Jute. But actually the foodgrains production was 1924 lakh tonnes, sugarcane production was 2830 lakh tonnes, cotton 131 lakh bales and Jute 89 lakh bales.

9. **Ninth Plan (1997-2002) :-** In the Ninth Plan, the expenditure on agriculture sector which include development of agriculture, irrigation and rural development was Rs.1,55,392 crores.
10. **Tenth plan (2002-07) :-** During this plan Rs 58,933 crore expenditure on agriculture was proposed.
11. **Eleventh plan (2007-12)—** During this plan the annual average increase in agriculture was 3.5% whereas the target was at 4%.

6. GREEN REVOLUTION

The term Green Revolution is a combination of two words – “Green” and “Revolution”. Green stands for greenery. Revolution means so sudden and fast changes that the spectators were wonder – struck. This term has been used for the progress of agricultural production. Because of the several agricultural reforms initiated during the period of first three plans in India, in 1967-68, the production of foodgrains increased by about 25% as compared to the last year i.e., 1966-67. Such a tremendous increase in the production of foodgrains in any one year was nothing short of a revolution. That is why, the Economists gave this spectacular increase in foodgrains production, the name of Green Revolution.

6.1 Definition

“Green Revolution refers to an extra-ordinary increase in agricultural production especially in Wheat and Rice, which was made possible due to the adoption of new techniques of High Yielding Varieties of seeds.”

In the words of J.G. Harrar, “The Green Revolution is the word generally used to describe the spectangular increase in the production of foodgrains that took place during 1968 and it is still continuing.

6.2 Features of Green Revolution

- (i) The year 1968 was the initial year of Green Revolution.
- (ii) Pant Agricultural University, Pant nagar (U.P.) made an appreciable contribution to it by evolving a new variety of seeds.

- (iii) Indian Agricultural Research Institute (I.A.R.I.), New Delhi has also made lot of contribution in this regard in bringing the Green Revolution.
- (iv) Credit of bringing Green Revolution in India goes to Dr. Norman E. Borlaugh and Dr. M.N. Swaminathan.

6.3 Main Elements of the Success of Green Revolution

In India, many factors are responsible for bringing this revolution in Agriculture. Following factors are worth mentioning :-

- (i) **High Yielding Varieties of Seeds :-** Use of High Yielding Variety (HYV) of seeds has played an important role in bringing the Green Revolution. First of all, these seeds were used in 1966. In India, Dr. Norman E. Borlaugh played an important role in the use of these seeds. The Indian Agricultural Research Institute (IARI) and Agricultural Universities have played an important role for the use of these improved seeds. By the end of Eighth Plan, 750 lakh hectares of land had been covered by HYV seeds. In Punjab, about 55 lakh hectares of land is cultivated by HYV seeds.
- (ii) **More use of Chemical Fertilizers :-** It is because of the increased use of chemical fertilizers that the production of foodgrains has gone up significantly. In 1967-68, 11 lakh tonnes of chemical fertilizers were used which increased to 139 lakh tonnes in 1996-97. By the end of Eighth Plan, consumption of chemical fertilizers was estimated to be 183 lakh tonnes. In Punjab, about 1285 thousand tonnes of chemical fertilizers were used.
- (iii) **More Irrigational Facilities :-** Expansion of area under irrigation has contributed a lot in bringing the Green Revolution. In 1965-66, irrigational facilities were available only to 320 lakh hectares of land whereas in 1995- about 1,082 Lakh hectares of land has been provided with irrigational facilities. In Punjab, in 2010-11, 7724 thousand hectares of land is under irrigation.
- (iv) **Use of Modern Agricultural Machinery :-** Green Revolution has been encouraged by the rapid increase in the agricultural implements in India. Farmers are making maximum use of tractors, tubewells, crushers, diesel engines etc.
- (v) **More Credit Facilities :-** As farmers are getting more credit facilities which enabled them to purchase and use HYV seeds, fertilizers and machines. In 1967-68, credit amounting to Rs.400 crores was made available through co-operative societies. In 1996-97, agriculture sector obtained Rs.28,817 crores worth of institutional credit. In Punjab, the Agricultural co-operative societies has given credit amounting Rs.852 crores.
- (vi) **New Techniques of Agriculture :-** Due to Intensive Agriculture Development Programme (I.A.D.P.) and latest inventions of All India

Agricultural Research i.e., (I.A.R.I.), a great attention was given to new agricultural techniques like crop rotation, fertilizers, water and use of improved seeds.

- (vii) **Plant Protection Measures :-** Earlier, there was no proper arrangement to protect the plants against diseases. Green Revolution has been made possible by plant protection measures. Under these measures pesticides are being used on the crops in the farms.
- (viii) **Price Incentives :-** With the huge increase in agricultural production there was a fear of fall in the prices of agricultural produce. For this purpose the government has established Agricultural costs and Prices Commission to fix the minimum prices of foodgrains. The Government itself purchases crops at these minimum prices, so that farmers could get reasonable prices for their produce.
- (ix) **Rural Electrification :-** Rural electrification has played a great role for the extension of green revolution. To improve the quality of rural life and to provide power to agricultural equipments, rural electrification programme has been introduced.
- (x) **Soil Conservation :-** Soil Conservation programme has been launched so as to extend Green Revolution. It has two objectives :- (i) to check the soil erosion and (ii) for reclamation of land. As a result of it, the area under cultivation has increased.
- (xi) **Marketing Facilities :-** In the past, the farmers were not getting fair price of their produce. That is why they could not invest much capital on the development of agriculture. But now there is a lot of improvement in the marketing of agricultural produce. Now by giving more care and expenditure than before by the farmers, the agricultural production has increased which ushered in an era of green revolution.

7. MAIN EFFECTS OF GREEN REVOLUTION

Green Revolution has brought many effects on the economy of India. It has provided a new base to the economy of the country. Its main effects are as follows:-

- (i) **Solution of Food Problem :-** As a result of Green Revolution, in 1967-68, and in the following years, production of crops increased rapidly. The year 1967-68 is called the year of Green Revolution. In this year, the production of foodgrains had increased to 950 lakh tonnes in India and in Punjab, the foodgrain production has increased to 119 lakh tonnes. Consequently, per capita availability of foodgrains has also increased. Import of foodgrains have decreased considerably. In this way, Green Revolution has proved helpful in solving the food problem of the country to a great extent.

- (ii) **Effect on Rural Employment :-** As a result of green revolution, mechanization of agriculture has increased and on the other hand agricultural activities have also increased. It was feared that unemployment will increase with the use of machines but due to the cultivation of more crops in a year the demand for labour has increased. On account of this, rural population has got the employment.
- (iii) **Reduction in Import of Food grains :-** In India, there has been a considerable fall in the imports of foodgrains due to Green Revolution. In the words of Prof. Dantewala, "Green Revolution has given breathing time and planners will now attend to Indian Plans."
- (iv) **Development of Industries :-** Green Revolution has a favourable effect on the development of industries. There is a considerable increase in the setting up of chemical fertilizers, tractor and diesel engine manufacturing industries.
- (v) **Effect on Prices :-** During the Third Five Year Plan, prices, especially prices of agricultural commodities, had a sharp rise. However, due to Green Revolution, the pace of price-rise slowed down.
- (vi) **Prosperity of the Farmers :-** The Green Revolution has very much improved the economic condition of the farmers. Their standard of living has gone up very much than before.
- (vii) **Ploughing Back of Profits :-** The one good effect of the Green Revolution is that now the farmers are also induced to invest large part of their income on the development of agriculture.
- (viii) **Change in Thinking :-** Green Revolution has completely revolutionized the thinking of the Indian rural people. Now they are convinced that with the help of science they can change their misfortunes into fortunes.
- (ix) **Effect on Consumers :-** Poor Indians spend about 80% of their income on agricultural commodities. Green Revolution has helped them to balance their budget and raise their standard of living.

In short, the main aim of the Green Revolution is to satisfy the hunger of hungry people and to accelerate the rate of economic growth. Green Revolution is heading towards this objective.

QUESTIONS

I. Very Short Answer Type Questions :

1. "Agriculture is the main source of employment in India." Write a short note on it.
2. What are the main land reforms of India? Write anyone of the reforms.
3. What do you mean by Green Revolution?
4. How has Green Revolution helped in solving the Indian food problem?

II. Short Answer Type Questions :

1. Describe the importance of agriculture in Indian economy.
 2. Describe the main problems of Indian Agriculture.
 3. Explain the contribution of government in the development of Indian agriculture.
 4. Write the main elements of success of Green Revolution.
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CHAPTER 4

INDUSTRIAL DEVELOPMENT IN INDIA

1. INTRODUCTION

For economic progress of underdeveloped countries like India, industrialisation occupies an important place. Only through industrial development by increasing the rate of production and employment the rate of growth of Indian economy can be increased. Prior to Independence, industrial development was very low in India, but after Independence, government laid great emphasis on the industrial development of the country. As a result of it, many new industries were established in the country and production capacity and the efficiency of the existing industries were also enhanced. Under the Five Year Plans, the industrial development has also been given much importance.

1.1 Need for Rapid Industrialisation

From economic point of view industrialisation is very much important in India. The need for rapid and balanced growth of industrialisation is due to many causes which are as follows :-

1. Help in Establishment of Balanced Economy

Indian Economy is an unbalanced economy because the bulk of working population and capital of the country is engaged in agriculture. There is uncertainty in agriculture. Industrialisation will make the economy a balanced one and it will reduce the dependence on agriculture.

2. Increase in Employment

Through industrialisation, new industries are established. As a result of it, the millions of unemployed persons get work in these industries, and it will solve the unemployment problem of the country. In 2009-10 the share of industries in the total employment of the country was 21.9%

3. Increase in National Income

In India, industrialisation will bring better and proper utilisation of natural resources. It will increase total production, employment national income and per capita income of the country. The contribution of industries in the national income of India is about 28 percent.

4. Less Pressure of Population on land

About 70% of India's population depends on agriculture, Which is the main cause of the backwardness of Indian agriculture. The development of industries will reduce the pressure of population on agriculture. As

a result of it the size of the agricultural holding increases and there will be more agricultural development.

5. Essential for National Defence

Through industrialisation many industries like iron, steel, aeroplanes, defence, production etc. can be established which are very important for the security of the country, because these industries manufacture large quantity of war materials.

6. Self-dependence

Industrial development makes provision for the production of essential goods in the country. As a result there will be less dependence on other countries and our country will become self-sufficient in the production of large number of goods.

7. Production of Socially Useful Goods

Through industrialisation the production of essential goods like cloth, cycles, electric goods, paper, oil etc. has become possible.

2. GROWTH OF INDUSTRIALISATION IN INDIA

Before independence there was a lopsided development of industries in India. The basic big industries like – machines, iron and steel, electrical goods, and the industries relating to the means of transport were having very little impact in the country. There were only the consumer goods industries like cloth, jute, sugar, matches etc. in the country. Small scale and cottage industries were also not well developed. But after the independence, industrialization of the country has been done to a great extent. As a result of it, India ranks 10th in the industrialised countries of the world. The main features of the same are as follows:-

(i) Strong Industrial Base

With the economic planning the industrial base of India has become stronger than before. The share of consumer goods industries was 70% in 1951. Whereas, now it is only 30%. In the planning period, with the development of basic industries like steel, machines, electric goods, engineering goods there has been more variety in production. Many new and important goods are now being produced in the country. As a result of it, the industrial development has become more balanced.

(ii) Modernisation

The production techniques of many industries have been improved by modernisation of industries. The production techniques of new industries has been kept at the most modern level. Foreign technical assistance

has been obtained for this purpose. As a result of it, the quality of industrial production has improved.

(iii) Development of Public Sector

In public sector many different industries have been set up through heavy investment which were essential for rapid growth of economic development and in which private sector was not interested. In 1951, the public sector's total investment was Rs.29 crores which increased to Rs.20,2020 crores in 1998.

(iv) Building Up of Infrastructure

For industrial development, the infrastructure like – electricity, roads, railways, means of communication, finance etc. are very much required. Under five year plans, a lot of infrastructure has been built up like : Many new industries have been set which are manufacturing electrical goods, railway engines and wagons, telephone equipment etc. and many industrial financial institutions have also been set up in India.

(v) Increasing Share of Industries in National Income and Exports

The percentage contribution of industries has been increasing in national income of India. In the First Five Year Plan, only the 16% of total national income was contributed by industries, but during the whole Five Year Plans period, due to the impact of industrial development, about 28% of national income was contributed by industrial sector. In India, about 45% of total exports is contributed by industries.

(vi) Increase in Foreign Collaborations

During the planning period a large number of industries have been established with the help of foreign assistance. As a result of new industrial policy, it is expected to rise more rapidly. Now Indian have established different industries in foreign countries like – Malasia, Indonesia, Nepal etc.

(vii) Increase in Industrial Production

Due to five year plans, industrial production of the country has increased to a great extent. Many new goods are being produced in our country. The estimate of the increase in industrial production during the planning period can be made by the following table:-

Table : Production of Important Industries

S.NO.	INDUSTRY	UNITS	1950-51	2006-07
1.	Finished Steel	lakh tonne	10	5,020
2.	Coal	lakh tonne	328	4,620
3.	Petrol	lakh tonne	03	340
4.	Pure Copper	thousand tonne	7.1	39
5.	Paper	thousand tonne	116	4,139
6.	Cement	Lakh tonne	27	1,547
7.	Bicycle	Thousand	99	10,598
8.	Tractors	Thousand	Nil	311
9.	Scooter and Motor Cycles	Thousand	Nil	8,436

(Sources :- *Economic Survey, 2007-08*).

It is clear from the above table that before the start of Five Year Plans i.e. before 1951, some products like machinery, tractors, scooters etc were not produced at all in our country. But now these goods are being produced in the country in a greater quantity. India stands at number 10 in industrialised world in the industrial production because of the industrial development during the planning period.

Present Industrial Structure

India's present industrial structure includes the following industries :-

(i) Public Sector, Joint-Sector and Private Sector

In India three types of undertakings are found i.e. Public, Joint and Private Sector. Public sector undertakings are those undertakings which are owned by the government. Joint sector undertakings are those undertakings which are jointly owned by the government and the private sector. Private sector undertakings are those undertakings which are owned by private persons.

(ii) Non-Factory Manufacturing Units

These are of two types

- (a) Cottage industries
- (b) Small industries

(iii) Factory Manufacturing Units

Factory manufacturing units are of two types.

- (a) **FERA Companies** :- These companies make production on large scale and use foreign exchange in a larger quantity.

- (b) **MRTP Companies** :- These companies work under Monopoly and Restrictive Trade Practices Act (MRTP-Act) and they produce on a very large scale.

In the industrial production of India the importance of cottage and small scale industries is more in comparison to other industries except public sector undertakings. About 40% of total production of the country is contributed by these undertakings. The percentage share of "FERA Companies", MRTP companies and other private companies in the total production is less than the cottage and small scale industries in our country.

4. COTTAGE INDUSTRIES

"Cottage industries are those industries which are completely or partially run by the members of a family either as a whole time business or as a part time business". Mostly these type of industries are run by the artisans in their homes. Machines are rarely used. Usually these industries fulfil the local requirements. These industries are run by the members of the family. Workers on labour basis are rarely used. They need very less capital. Since these industries are mainly situated in villages, so these are also known as "Village or Rural Industries".

(a) Importance

Following are the main advantages of these industries :-

- (i) Employment opportunities have increased in the Villages because of the establishment of cottage industries.
- (ii) Artistic costly goods are also produced in these cottage industries.
- (iii) Tendency of shifting population from villages to cities is reduced by their establishment in the villages.

(b) Causes of Decline

The main causes of decline of cottage industries of India are as follows:-

- (i) 'Cottage industries' production cannot compete with the cheap production made by modern industries.
- (ii) They do not get cheap finances in an adequate quantity.
- (iii) Village artisans do not have the knowledge of modern business progresses, researches, designs and techniques of selling and advertising.

(c) Measures for Development

Various measures have been taken up for the development of cottage industries like :-

- (i) Khadi and Village Industries Commission has been set-up which looks after the special needs of these industries.
- (ii) Economic assistance is given to promote sales of these industries.

- (iii) Many institutions have been set-up to give them advice regarding the improvement in designs and to boost up their production and sales.

4.1 Small Scale Industries

Meaning

Small scale industries were defined on different basis but since June, 1997 all those factories were included in small industries which have an investment of Rs.3 crore in fixed capital. In ancillary industries the limit on capital is fixed as Rs.3 crore and in Small industries the limit on capital is fixed as Rs.25 lakh. In 1996-97, there were 27.24 lakh tiny industries in India whereas in Punjab there were 1.88 lakh tiny industries and 415 large and medium scale industries. In 2003-04 there were 115.22 lakh industries in India.

4.2 Difference Between Small Scale and Cottage Industries

Clarifying the difference between small scale and cottage industries, the Fiscal Commission has written that "Cottage industries are normally set-up in rural areas and these are related to agriculture and they provide full time employment to the people. Whereas small-scale industries are set-up in cities and semi-urban areas and they provide full time employment to the workers."

The main differences in these are as follows :

- (i) Cottage industries are normally set up in villages and they are spread throughout the country, whereas small scale industries are mostly set-up in cities.
- (ii) In cottage industries, only family members work whereas in small-scale industries, work is done through hired workers.
- (iii) Cottage industries normally fulfil the local needs whereas small-scale industries produce goods for cities and semi-urban areas. So their production market is very large.
- (iv) In cottage industries, production is done with the help of simple tools and very less capital is required. Whereas small scale industries are run with power and more working capital is also required.
- (v) In cottage industries, traditional goods like khadi mats and shoes etc. are produced whereas in small-scale industries modern goods like Radio, Television, Electrical and Electronics goods etc. are produced

4.3 Importance of Small-Scale and Cottage Industries

The importance of small-scale and cottage industries is clear from the following factors:-

- (i) **More Employment** :- In cottage and small-scale industries, more employment can be given by investing less of capital. These industries are labour-intensive. Therefore, there is more possibility of increase in

employment opportunities with the development of these industries.

- (ii) **Equal Distribution of Wealth** :- Income and wealth are equally distributed because of these industries. Its reason is that in these industries capital is not centralised in the hands of a few people rather it is divided in a smaller quantity. Therefore, whatever income is generated from these industries, its benefit goes to the maximum number of people.
- (iii) **Decentralisation** :- Mostly big industries have the tendency of being centralised at one place in cities. As a result of it the economic development of the country becomes unbalanced and there is always a fear of these industries being destroyed by the enemy during the days of war, whereas small-scale industries are spread over the entire country and there is no fear of these being destroyed during the days of war. As a result of it, the demerits of urbanisation in cities, like, shortage of houses, increase in prices, exploitation of women and children etc. are avoided.
- (iv) **Increase in Production** :- There is a keen possibility of increase in production of the country by these industries. Out of the total industrial production 60% is obtained from big industries and 40% from cottage and small scale industries.
- (v) **Exports** :- There is a lot of importance of these industries in the exports of the country. In 1996-97, in the total exports of the country the small scale sector's contribution was 34%. In the export of non-traditional goods like electrical goods, electronic equipment etc. small scale sector's share was 38%.
- (vi) **Use of Local Resources** :- Small scale industries use those resources which they get locally. These resources are not required by big industries.
- (vii) **Less Pressure of Population on Agriculture** :- Land has been divided into smaller pieces because more population is dependent on agriculture. Every year 30 lakh more people are added to become dependant on agriculture. To reduce the burden on land, establishment of cottage industries is very much essential.
- (viii) **Suitable for under-developed country like India** :- In India capital is scarce and workers are in abundance. Such type of industries are labour-intensive. Therefore in an underdeveloped country like India, these industries are even more important.
- (ix) **Artistic Goods** :- The production of artistic goods is possible only through these industries. In India such type of goods are manufactured by these industries like Banarsi Sarees, Ornaments and Ivory goods etc.
- (x) **Individual Taste** :- These industries can produce according to the taste of every customer. Thus these industries have special importance to fulfil the individual tastes of the people.

- (xi) **Complementary of Large Industries** :- These industries are complementary to big industries. These industries can produce those goods which are also used in big industries like small parts of cycles, motors, machines etc. can be manufactured in a cheaper way in small scale industries.
- (xii) **Experience from Foreign Countries** :- These industries played an important role in the development of the countries like Japan, America and England. In Japan 83% of population work in these industries. In America these industries give employment to 65% of labourers and in England 30 lakh people work in these industries.

4.4 **Problems of Cottage and Small Scale Industries**

The main problems of cottage and small scale industries are as follows:-

- (i) **Problem of Raw Material and Power** :- These industries do not get raw material in sufficient quantity and whatever material they get it is of poor quality and for it they have to pay higher prices. As a result of it production cost increases. These industries have also to face the problem of the shortage of electricity and coal.
- (ii) **Problem of Finance** :- In India credit is not available to these industries in sufficient quantity. They have to depend on money-lenders for finance who charge very high rate of interest.
- (iii) **Old Methods of Production** :- In these industries mostly old methods of production are used. Old tools like oil press for oil expelling or handlooms for weaving clothes are used. As a result of it the quantity of production decreases and poor qualities of products are manufactured. Their demand in the market goes down.
- (iv) **Problems of Marketing** :- The entrepreneurs of these industries face many problems in selling their products at fair price and quantity because the outward look of the products produced by these industries is not good.
- (v) **Competition with Large Scale Industries** :- The main problem of these industries is that they have to compete with the goods produced in big industries. Goods produced by big industries are comparatively cheaper and of good quality. Thus, the small scale industries cannot compete with big industries.

4.5 **Measures For Improvement**

- (i) **Restricted Production Programme** :- According to this programme, the production of some goods has been reserved for small scale industries and expansion of big industries is prohibited. Thus 836 goods have been reserved to be produced by small scale industries.
- (ii) **Purchase by Government** :- Government also purchases a lot of goods manufactured by small scale industries. National Small Industries

Development Corporation helps a lot to the small scale industries in selling their goods to the Government.

- (iii) **Financial Help** :- Government banks and state financial corporations provide sufficient finance at lower rate of interest to the small scale industries. For this purpose Small Industries Development Bank has been set-up.
- (iv) **Marketing Facilities** :- Special efforts have been made for selling goods manufactured by these industries. In different parts of the country, stores and shops are opened to sell the goods produced by these industries. In foreign countries, publicity is done through advertisement, exhibitions and fairs in order to sell their products.
- (v) **Technical Assistance** :- To provide technical assistance, Small Industries Service Institutions (SISI) have been set-up in all the states by Small Industries Development Organisation.
- (vi) **District Industries Centres** :- To fulfil all the requirements of cottage and small industries a District Industries Centre has been set-up in each district of the country.
- (vii) **Industrial Estates** :- For the development of these industries, Government has set-up industrial estates. In these industrial estates, government acquires the land and then develops it. Buildings are constructed for industries. Arrangements are made for water, electricity, gas, rail and safety purposes. After that the government sells these sheds at low price or on rental basis to the industrialists.
- (viii) **Other Concessions** :- Small scale industries are given different types of tax incentives and other financial incentives which are not available to big industries.

5. LARGE SCALE INDUSTRIES

The role of large scale industries is very important for the economic development of India. The major share of fixed capital invested in industries has been invested in big industries. A large portion of the total industrial production is received from these industries.

5.1 Classification of Large Scale Industries :- In India large scale industries have been classified into four categories:-

- (i) **Basic Industries** :- Basic industries are those industries which provide necessary inputs to agriculture and industries. The examples are : steel, iron, coal, chemical fertilizers, aluminium and electricity.
- (ii) **Capital Goods Industries** :- Capital goods industries are those industries which produce machinery and instruments for agriculture and industries. These include machines, mechanical instruments, tractors, truck etc.
- (iii) **Intermediate Goods Industries** :- Intermediate goods industries are those industries which produce those goods which are used for the production

of other goods. The examples of these are tyres, mobile oil etc.

- (iv) **Consumer Goods Industries** :- Consumer goods industries are those industries which produce consumer goods. These include – Sugar, cloth, paper industries etc.

5.2 Importance of Large Scale Industries

The importance of large scale industries in industrialisation of India is clear from the following factors:-

- (i) **Production of Capitalistic and Basic Goods** :- For the industrialisation of a country, capital goods like machines, instruments and basic goods like steel, iron, chemicals are of great importance. The production of these capital and basic goods is possible only by large scale industries. For the production of these goods, large quantity of capital and latest techniques are required. Its arrangement is possible only by large scale industries. In Punjab large scale industries produced goods worth Rs.13,500 crore in 1994-95.
- (ii) **Economic Infrastructure** :- Economic infrastructure like means of transport, electricity, communication facilities etc. are very much required for industrialisation. Only big industries can produce means of transport like railway engines and wagons, trucks, motors, planes etc. The production of big electrical equipments, transformers, means of communication like telephone, radio, transistor etc. is possible only by large industries. Thus large scale industries, by providing the means of economic infrastructure can speed up the pace of industrialisation.
- (iii) **Research And High Technique** :- For industrialisation of any country, research and high techniques are of very much important. A lot of money and able researchers are required for this purpose. Only large scale industries can arrange required money for research and able researchers.
- (iv) **Increase in Productivity** :- Because of large investment in big industries, per unit capital is more. Per unit productivity increases a lot because of it. Prices decrease because of increase in productivity and as a result demand increases. By the increase in quantity of industrial production, the chances of setting up of new industries increase which results in the development of cottage and small scale industries. As a result of it the tendency towards industrialisation increases in the country.
- (v) **Availability of Economies** :- Because of the establishment of large scale industries goods are produced on large scale and at low cost. As a result of it industries start enjoying many types of economies which results in the reduction of their costs. Their competitiveness increases in the internal and external market. As a result of it the setting up of many new and export-oriented industries becomes possible.
- (vi) **Establishment of Ancillary Industries** :- The large scale production of some goods like aluminium, steel, cars etc. is possible only in large

scale industries. The setting up of some ancillary units is encouraged because of these industries. For example with the setting up of Maruti Udyog Ltd. the establishment of many ancillary industries like rubber, plastic, electricity etc has become possible. These Industries produce raw material for Maruti Udyog. In this way the development of industrialisation has taken place in the country.

6. Causes For Slow Progress of Industrial Development of the Country :-

Though India's place in the industrialised countries of the world is 10th yet india's industrial development is very slow and it is at a very lower rate. The industrial history of India tells that whereas very less attention was given to the setting up of industries before Independence, but special measures have been taken for the setting up of industries after Independence especially during Five Year Plans period since 1951. That is why there has been some improvement in economic conditions. Causes of the slow progress of India's industrial development are as follows:-

- (i) **Foreign Rule** :- The English rule remained in India for about 150 years. During this period they destroyed the cottage and small scale industries of India and made it raw-material exporting market. Even those few industries which were set-up in the country, were the results of the efforts of private individuals. The English Government followed the Discriminating Protection Policy for the industries. Only a few industries got the benefit of this policy.
- (ii) **Scarcity of Capital** :- For the development of industries, capital is very much needed. In India majority of the people are poor and they can not accumulate capital. Those people who have capital, they prefer to invest the same in more safer activities like purchase of property, Govt. bonds, business, Gold or construction of houses etc. and they do not take the risk by investing the money in industries.
- (iii) **Shortage of Skilled Workers** :- Skilled hard working and honest workers are very much required to run the modern industries in a proper way. There is shortage of skilled and honest workers in India. Most of the workers here are the farmers doing agriculture. They come to cities for jobs for some time. They do not try to take the necessary training to work in industries. Thus the work done by them is of poor quality and is very costly.
- (iv) **Shortage of Cheap Energy Resources** : Cheap energy is required to run the industries. There are three main energy resources in India – coal, oil and electricity. The coal which is available in India is of poor quality and the coal mines are situated only in specific areas, like Bihar and West Bengal. A lot of money is being spent in sending the coal to different parts of the country. Abundance of electricity can be generated in India but even this has not been fully developed. India has to depend

on other countries for oil. Oil prices have increased many folds since 1973.

- (v) **Shortage of Efficient Managers** :- In India there is a shortage of able and efficient managers and industrialists. India has always been an agriculture dominating country because of the prevalence of social atmosphere, orthodox thinking of the people and lack of educational facilities. Even educated people want to do clerical or government service rather than running an industry.
- (vi) **Shortage of Raw Material** :- In India raw-material for industries is available in very less quantity and of poor quality. After the partition of the country there was a shortage of jute and cotton-etc. A lot of money was to be spent in importing these goods from foreign countries which resulted in the increase of production costs. Poor quality goods were produced because of the poor quality of raw-material. The shortage of a few minerals like tin, glass, sulphur, zinc etc. has proved great hindrance in the industrialisation of our country.
- (vii) **Poverty** :- India is a poor country. The demand for costly industrial goods remains limited because of poor people. The rate of industrial progress is very slow due to the lack of demand. Due to poverty, savings are less and as a result investment is also less.
- (viii) **Shortage of Financial Organisation** :- Every industry needs finance from time to time. If that finance is available at low rate of interest and in sufficient quantity then industries can progress a lot. There is a shortage of financial organisation like industrial banks providing long term loans to industries at low rate of interest. Before Independence there was no industrial bank. Now some financial organisations have been set up but these are also not able to fulfil the whole needs of industries.
- (ix) **Unplanned Development** :- In India, Industries have not been set-up in any planned way. In few cities like Mumbai, Kolkata, Ahmedabad, Chennai, Delhi, Bangalore etc., most of the industries have been set-up, whereas other areas of the country have remained industrially backward. This unplanned setting-up of industries is harmful from the economic point of view, improper from war point of view and unwanted from social point of view.
- (x) **Less Development of Transport and Communication** :- For the development of industries it is essential that transport and communication means are fully developed so that raw-materials to the factories and finished goods to the market are easily sent. But in India these means are less developed. Even telephone, telegram, postage etc. were not developed upto the satisfaction level. For foreign trade we have to depend mainly on foreign ships.

- (xi) **Government Interference** :- Before 1991, there were many Government restrictions on industries. Some industries were not allowed to be set-up in private sector. There were different types of restrictions on the expansion of large industries. A lot of time was wasted in getting the approval from the government for setting-up of the industries. There was slow development of industries due to the government interference. But now with new liberal industrial policy, this problem has been solved to a great extent.

7. **ROLE OF GOVERNMENT FOR ENCOURAGEMENT OF INDUSTRIAL DEVELOPMENT IN INDIA**

To speed up the pace of Indian economy, to achieve the target of self reliance and to increase the means of employment and income the government of India has given great importance to the development of industries under Five Year Plans. As a result of it, the development of industries has been very fast which is clear from the following facts :-

- (i) **Public Sector Outlay During Five Year Plans and Increase in Industrial Production Growth** :- In India the process of Five Year Plans was started in 1951. A very huge amount of money has been invested for the development of industries in public sector from the 1st Five Year Plan upto the Eighth Five Year Plan. As a result of it the role of industrial development has increased.

Expenditure on industries in public sector is increasing right from the First Plan. As a result of it, Industrial Production Growth rate has also been continuously increasing.

- (ii) **More Credit Facilities** :- To speed up the industrial development Government has set-up many financial institutions in the country for providing loans to industries like-Industrial Finance Corporation in 1948, National Industrial Development Corporation in 1954, Refinance Corporation in 1958, Industrial Credit and Investment Corporation of India (ICICI) in 1955, Industrial Development Bank of India (IDBI) in 1964, Unit Trust of India and Small Industries and Development Corporation of India (SIDCO). Through these financial institutions, financial requirements of the industries are met.

- (iii) **Establishment of Basic Industries** :- The Government of India has given more emphasis on the establishment of basic industries in order to increase the pace of economic development in the country. There were only 5 units in public sector in 1951 which have increased to 264 in 1996. Similarly capital investment has increased from Rs.29 crores, to Rs.118492 crores. The private sector is also developing side by side. In this way India has become self-sufficient in case of Industrial consumer goods.

- (iv) **Development of Means of Transport** :- The means of transport are very much important for the industrial development. Thus means of transport have been developed tremendously in the country so that industries can be decentralised and their goods can be sent to far away places with ease.
- (v) **Development of Power Sector** :- Cheap electric power is very much essential for the development of industries. For this purpose, multi-purpose project plans and thermal power houses were set-up under Five Year Plans to increase the production of electricity. Electricity production has increased from 5.1 billion Kilowatts in 1951 to 296.7 billion kilowatts in 1996. With the increase in electricity production and fulfillment of power requirements of the industries, the production of industries has increased many-fold.
- (vi) **Invention Promotion and Import Substitution** :- For the promotion of inventions in the country, Inventions Promotion Board' was set-up in 1960. Its' main objective is to give financial and technical assistance for inventions. Similarly in order to achieve self-sufficiency in case of the raw material and new techniques which were earlier being imported from foreign countries, the import Substitution Board was set-up in 1966. It's main purpose is to encourage import substitution.
- (vii) **Industrialisation of Backward Areas** :- For the development of backward areas main stress is being given on the industrialisation of these areas. In order to encourage the setting up of industries in the industrially backward areas of the country after identifying industrially backward areas, many facilities like subsidy, credit at cheap rates, supply of electricity and of raw material etc. are given. For the development of backward areas a target of 100 development centres and Rs.3000 crores of investment were earmarked in the Eighth Five Year Plan.
- (viii) **Renewal of Sick Industrial Units** :- For the renewal of sick industrial units in the country, Board of Industrial Finance and Reconstruction and National Renewal Fund were set-up. For example government has taken control over 125 sick cotton textile units and National Textiles Corporation has been set-up for the management of these units. Similarly efforts are being initiated for the renewal of 58 industrial units of public sector which were running in losses. In 1992-93 a loan of Rs.500 crore was given on concessional rates to the National Renewal Fund by International Development Agency.
- (ix) **Establishment of Technical Development Board** :- Technical Development Board was set-up in 1976. Its main objective was the modernisation of industrial units and upgradation of technology in industrial capital goods, technical knowledge, Drawing and design and consultancy services from foreign countries to make them capable of

adopting latest technology. Now a limit of Rs.2 crore per annum has been fixed to import essential goods regarding upgradation of technology. Keeping in view the requirements of units permission can be granted to import capital goods exceeding this limit.

- (x) **New Industrial Policy and Industrial Development :-** In July 1991, revolutionary changes were made in industrial policy. Now except for 18 industries there is no need of obtaining a licence for setting-up other industries. In 1999 only 6 industries had to obtain licence. Through this liberal policy efforts have been made to encourage foreign investment. By this policy efforts are being made to encourage privation and pushing the economy towards Free Market Economy. Every possible effort is also being made to improve the public sector.

In this way by taking up the above mentioned steps by the government, industrial development has been encouraged a lot in India. As a result of it the country has become almost self-sufficient in industrial goods.

QUESTIONS

I. Very Short Answer Type Questions :

1. Give any two examples of basic industries.
2. What is meant by Cottage industries?
3. What is meant by small scale industries ?
4. State one problem of small scale industries ?

II. Short Answer Type Questions (Answer in about 50-60 words) :

1. Explain the reasons behind the need for rapid and balanced industrialisation in India.
2. What do you mean by small scale and cottage industries in India? What are their problems?
3. What is the importance of small scale and cottage industries in India?
4. Distinguish between small scale and cottage industries in India and suggest remedies to solve their problems.
5. Discuss the importance of large scale industries.
6. What are the reasons responsible for slow progress of industrialisation in India?
7. Write a short note on the role of government to encourage the development of industrialization in India.
