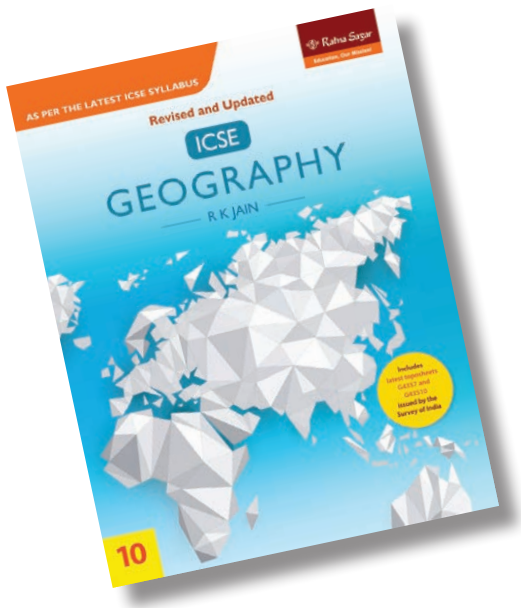
COMPANION

ICSE
GEOGRAPHY



Ratna Sagar

Chapter 1

PRACTICAL GEOGRAPHY – STUDY OF TOPOGRAPHICAL MAPS

A. Distinguish between the following.

1. Map distance and Ground distance

Ans. The distance between any two places on a map is called the map distance. The distance between the same two places on the ground is called the ground distance.

2. Magnetic North and True North

Ans. The needle of a magnetic compass always points towards the Magnetic North Pole. It is called the Magnetic North. The position of the Magnetic North can change from time to time and also from place to place.

The True North is the direction towards which the North Pole of the earth points. It is fixed and is also known as the Geographic North.

3. Spot Height and Bench Mark

Ans. Spot height shows the exact height of a place above the mean sea level on the map. It is shown as a dot in black colour, followed by a number, which is the height of that point. It is indicated as ·500. Spot height is marked on the map after actual survey.

Marks shown on the map for prominent places, such as rocks or buildings in the field are called the Bench Marks. They indicate the actual height of these places and therefore marked on the map after actual survey. The Bench Mark of a place is marked on the map as ·BM225. It serves as a point of reference for other places.

4. Linear and Radial settlements

Ans. Linear settlements generally develop along either sides of roads, railways, rivers or canals. The floodplains in hilly areas mostly have linear settlements.

Radial settlements are common in both towns and villages, where the dwellings spread out in several directions from a central point, which is either around a big water body or where many routes join together.

5. Compact and Scattered settlements

Ans. In Compact settlements, houses are built close to each other. They generally develop close to a railway station, a well, a quarry or an industrial site.

In Scattered settlements, houses or the individual farmhouses are isolated or scattered and are located away from each other. They develop mostly in the plateau, forested or hilly areas.

6. Drainage basin and Drainage pattern

Ans. The main stream, with all its tributaries, develops a drainage system and the total area occupied by a drainage system is known as the drainage basin. The higher ground that separates the two drainage basins is called the watershed.

The drainage pattern means the special arrangement of streams in a particular region.

It reflects the relief of the area, the nature of the rocks and the slope of the land found in the particular area. It also shows the amount of rainfall in the area.

B. Answer the following questions very briefly.

1. Which organisation has prepared the topographical maps of India?

Ans. The Survey of India has prepared Topographical Maps or Topo Sheets for India and the adjoining countries on different scales.

2. Name the various types of scales given on a topo sheet.

Ans. The various scales given on a topo sheet were 1": 16 miles, 1": 4 miles and 1": 1 mile. After the introduction of the **metric system** of measurement in India, the scales of these topo sheets were changed to 1 : 1,000,000, 1 : 250,000 and 1 : 50,000.

3. What is arbitrary grid on a topo sheet?

Ans. On the topo sheets prepared by the Survey of India, it is difficult to calculate the exact latitude and longitude of a place. To solve this problem, a set of vertical and horizontal lines is drawn in red colour on the topo sheet. These lines also form a grid and a network of squares. This is called the arbitrary grid system.

4. What is the difference between northings and eastings?

Ans. The grid lines that run horizontally (from east to west) on the topo sheets are called the northings, as these lines lie towards the north of the southwest corner. On the other hand the grid lines that run vertically (from north to south) on the topo sheets are called the eastings, as these lines lie towards the east of the southwest corner. The eastings and the northings intersect to form a network of squares called the grid system.

5. Name different ways of showing relief on a map.

Ans. Several methods have been developed to show the relief features on a map. Some of them are – the contours, formlines, layer-colouring, hill-shading, spot heights, bench marks, hachures, etc.

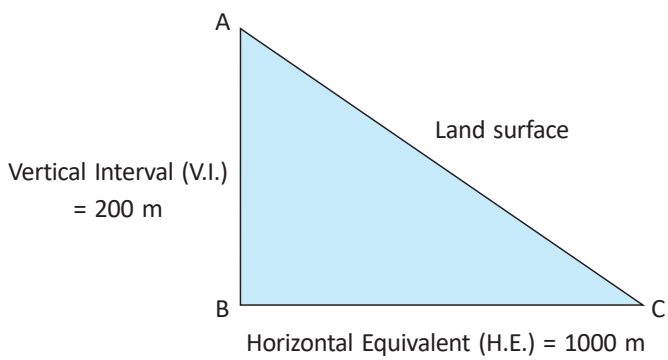
6. What is the scale on a four degree topo sheet?

Ans. The extent of a four degree topo sheet is 4° of latitude and 4° of longitude. The scale of the sheets in this series is 1 : 1,000,000 or 1 cm : 10 km.

C. Answer the following questions briefly.

1. What is gradient and how can we calculate it?

Ans. Gradient means the amount of steepness of the slope. The gradient or slope is normally expressed by stating how much one should travel to gain a given height.



In this right-angled triangle, CA is the distance to be travelled to gain the height AB (200 metres). AB is the vertical interval (V.I.) which can be easily found from the contours. BC is the horizontal equivalent (H.E.), which can be easily measured from the contour map. The ratio between V.I. and H.E. gives the measure of the steepness and is called the **gradient**.

$$\text{Slope or Gradient} = \frac{\text{Vertical Interval or V.I.}}{\text{Horizontal Equivalent or H.E.}} = \frac{200\text{ m}}{1000\text{ m}} = \frac{1}{5}$$

This means a rise of 1 metre height in a horizontal distance of 5 metres covered.

2. What is magnetic declination as given on a topo sheet?

Ans. The angle between the True North–South line and the Magnetic North–South line is known as **Magnetic Declination**. The value of the magnetic declination is always given on every topo sheet.

3. What is the advantage of contour lines over formlines?

Ans. A relief map shows the height of land above the mean sea level on a flat surface. Several methods have been developed to show the relief features on a map. Contours and formlines are such two methods. These methods have their merits and demerits.

A contour is an imaginary line of constant height above the mean sea level. The difference between the value of any two successive contours is known as the **contour interval**, or the **vertical interval** (V.I.). The horizontal distance between any two contours is called the **horizontal equivalent** (H.E.). Its value depends upon the slope of the land.

Formlines are approximate contour lines, based on general observation. They show approximate heights of the place. The formlines help in finding the minor details of topography.

4. Name the various functions of an urban settlement.

Ans. The settlements are generally divided into two types– urban and rural or towns and villages. The urban settlements are differentiated from the rural settlements on the basis of certain characteristics, such as the size and density of population, economic basis, administrative basis, and the number and quality of public utility services. The urban settlements are mostly classified on the basis of their functions. Some of them are:

1. Administrative towns: Like the capital cities
2. Defence towns: Centres of military activities
3. Cultural towns: Religious, educational or cultural centres
4. Economic towns: Trading centres, mining towns, industrial centres, transport centres, etc.

5. Explain the meanings of blue, red, yellow and green colours on a topo sheet.

Ans. Many colours are used on a topo sheet to represent certain physical, economic or cultural features. The **blue colour** is used to show all physical features associated with water such as seas, rivers, ponds, wells, tubewells and springs. The **red colour** is used for settlements, roads, and arbitrary grid lines, that is eastings and northings. The cultivated areas are shown in **yellow colour**. The **green colour** is used for showing forested areas, trees, scrubs, orchards, etc.

6. What is included in the marginal information on a topo sheet?

Ans. The study or interpretation of a topo sheet can be done under the following heads:

Marginal Information on a topo sheet includes

a. name of the topo sheet
b. number of the topo sheet
c. area shown on the sheet
d. area covered by the topo sheet in square kilometres
e. latitudinal and longitudinal extent of the sheet
f. extent of the arbitrary grid
g. scale of the sheet
h. special information, if any.

D. Explain the following terms.

1. **Million sheet:** Each million sheet covers an area bounded by 4 degrees of latitudes and 4 degrees of longitudes. These sheets are on a scale of 1 : 1,000,000 or 1 cm : 10 km. There are 36 million sheets covering the whole of India. These sheets are numbered as 45, 46, 47, etc. or named after the most important town of the area.
2. **Grid on a map:** Most of the maps in the atlases, books or wall maps are marked with a network of parallels (lines of latitude) and meridians (lines of longitude). This network of parallels and meridians on the map forms a **grid**. If the latitude and the longitude of a place is known, we can locate that place on the map. Thus, the grid helps us in locating places on the map.
3. **Grid square:** The grid lines running vertically (from north to south) are called the eastings, whereas the grid lines running horizontally (from east to west) are called the northings. The eastings and the northings intersect to form a network of squares called the grid system. Each square in the grid system is called a **grid square**. The grid square on the topo sheet represents an area of 1 square kilometre on the ground.
4. **Scale:** The distance between any two places on a map is called the map distance. The distance between the same two places on the ground is called the ground distance. The ratio between the map distance and the ground distance is called the **scale** of the map.
5. **Grid North:** The Grid North is the direction of the North–South grid lines on the topo sheets. It coincides with the True North only along the meridian of origin. Thus, the true bearing of any point on the topo sheet can be measured with reference to the North–South line on the topo sheet.
6. **Vertical Interval:** The difference between the value of any two successive contours is known as the contour interval, or the vertical interval (V.I.).
7. **Water-divide:** The higher ground, which separates the two drainage basins, is called the watershed or the water-divide.
8. **Perennial river:** The stream or river which carries water throughout the year is called the perennial river.

E. On the contour map given below, do as directed.

1. Calculate the length of the railway track between the two railway stations.
2. Find the gradient between points A and B.
3. Make a list of the physical and man-made features on this map.
4. Find out the direction (bearing) of C and D from E.
5. Draw a cross section along H and K.
6. Shade the main water body (sea) in blue colour.

Ans. Map Work: Do it Yourself

F. Answer the following questions.

1. What are the main facts about intervisibility?

Ans. Sometimes it becomes necessary to find out from a contour map, whether one place is visible from the other and vice versa. This can be easily done by studying the relief along a straight line or the **line of sight** between the two places. If the contour map does not give a clear idea, then we can draw a cross section, between those two places on the contour map.

The main facts about **intervisibility** are:

- When the two places are on a level ground, the intervisibility will depend on the presence or absence of obstacles like trees and buildings.
- When the two places are on the same side of a valley, then both the places are intervisible.

- When the slope joining the two places is concave, then these two places are probably intervisible.
- When the slope joining the two places is convex, then these two places will not be intervisible.
- If the obstacle between the two places is higher than those places, then the two places will not be intervisible.
- If the obstacle between the two places is higher than one of the places, then the places may or may not be intervisible.
- If there is no obstruction along the line of sight between the two places, then the places are intervisible.

2. What are the main characteristics of the contour lines on a topo sheet?

Ans. Contours are imaginary lines joining places having the same elevation above mean sea level. The method of showing relief features through contour is very useful and versatile. The contour lines on a topo sheet provide a useful insight into the topography of an area. The difference between the value of any two successive contours is known as the **contour interval**, or the **vertical interval** (V.I.). The horizontal distance between any two contours is called the **horizontal equivalent** (H.E.). Its value depends upon the slope of the land. The contours are drawn in brown colour on the topo sheet.

Main characteristics of contour lines on a tope sheet:

- A contour line is drawn to show places of equal heights.
- Contour lines and their shapes represent the height and slope or gradient of the landform.
- Closely spaced contours represent steep slopes while widely spaced contours represent gentle slope.
- When two or more contour lines merge with each other, they represent features of vertical slopes such as cliffs or waterfalls.
- Two contours of different elevation usually do not cross each other.

3. What are the main features of the arbitrary grid system on a topo sheet?

Ans. The main features of the arbitrary grid system drawn on a topo sheet are:

- The southwest corner (bottom left) of the topo sheet is always taken as the starting point.
- The grid lines running vertically (from north to south) are called the **eastings**, as these lines lie towards the east of the southwest corner.
- The grid lines running horizontally (from east to west) are called the **northings**, as these lines lie towards the north of the southwest corner.
- The eastings and the northings intersect to form a network of squares called the **grid system**.
- Each square in the grid system is called a **grid square**.
- The point of intersection between the eastings and northings on the topo sheet is called the **coordinates**.
- The grid lines (the eastings and the northings) on the topo sheet drawn on the scale of 1 : 50,000 are always 2 centimetres apart, representing a distance of 1 kilometre on the ground.
- The grid square on the topo sheet represents an area of 1 square kilometre on the ground.
- The grid lines (the eastings and the northings) are always numbered in two digits, such as 00, 01, 02, …, 97, 98, 99.
- The value of the eastings increase, numerically, eastwards from the southwest corner.
- The value of the northings increase, numerically, northwards from the southwest corner.

4. How can we find the four-figure and six-figure grid references?

Ans. There are two types of grid references – the **four-figure grid** reference and the **six-figure grid** reference.

While finding the location of a place on a topo sheet, mention the easting on the left of the place and the northing below the place. While giving the grid reference of a place, the eastings are always quoted first, and then the northings.

The **four-figure grid reference** for the square shaded in pink colour in Fig. 1.4 is 25 07.

The first two figures are for eastings and the last two figures are for northings.

Thus in this grid reference 25 is the value of eastings and 07 is the value of northings in the four-figure grid reference.

To find the **six-figure grid reference**, first divide the grid square on the topo sheet into 10 equal parts – vertically as well as horizontally. These lines will give you the third figure for the eastings and the sixth for the northings. For example, the grid reference of church in Fig. 1.4 is 283 072. In this grid reference, 283 is the value of eastings and 072 is the value of northings. (Refer Fig 1.4 of the book)

5. What are the main advantages of conventional signs or symbols on a map?

Ans. The geographer uses a map for recording and showing a variety of information, such as political or administrative boundaries, relief features, drainage patterns, climatic conditions, distribution of resources, means of irrigation, means of transport, distribution of population, location of settlements and other social and cultural features.

The maps do not have enough space to accommodate the actual size and shape of various features like mountains, plateaus, plains, rivers, lakes, bridges, dams, forests, forts, temples, mosques, churches, railway tracks, roads, footpaths and settlements. But a map without these features will be less informative.

Thus, different **colours, signs, symbols** and **letters** are used to show various information on a map. The purpose is to make it both legible and informative as far as possible. To understand the information given in the map, meanings of certain signs and symbols should be understood. They are also given in the form of a **key** or **legend** on every topo sheet.

There is a common agreement among most of the countries about the size, shape and use of such signs and symbols. Thus, these are called the **conventional signs and symbols**. If a map-reader is familiar with the conventional signs and symbols, used by the Survey of India on the topo sheets, she/he can easily read any map of any country without much difficulty.

6. What are the main features of rural and urban settlements in India?

Ans. The form of settlement in any particular region reflects man's relationship with his environment. The various types of settlements have evolved over a long period of time. The development and growth of settlements also depend upon the religious and social customs of the society. The buildings used for various religious and social purposes, give the settlements their distinctiveness.

The settlements are generally divided into two types – **urban** and **rural** or towns and villages. The urban settlements are differentiated from the rural settlements on the basis of certain characteristics, such as the size and density of population, economic basis, administrative basis, and the number and quality of public utility services.

The haphazard growth gives the settlement an irregular shape. The urban settlements are mostly classified on the basis of their functions. Some of them are:

1. Administrative towns: Like the capital cities
2. Defence towns: Centres of military activities
3. Cultural towns: Religious, educational or cultural centres
4. Economic towns: Trading centres, mining towns, industrial centres, transport centres, etc.

The village, as a form of settlement, is closely related with the agricultural activities. The rural settlements can be compact or scattered. Generally the settlements have **five broad patterns**. These are:

Compact or Nucleated Settlements

In such settlements, houses are built close to each other. They generally develop close to a railway station, a well, a quarry or an industrial site.

Scattered or Dispersed Settlements

In such settlements, houses or the individual farmhouses are isolated or scattered and are located away from each other. They develop mostly in the plateau, forested or hilly areas.

Linear or Ribboned Settlements

Such settlements generally develop along either sides of roads, railways, rivers or canals. The floodplains in hilly areas mostly have linear settlements.

Rectangular Settlements

The pattern of such settlements are determined by the nature of junction of two or more routes. When they cross each other at right angles, the dwellings are built along the routes in all directions, thus forming rectangular settlements.

Radial or Star-shaped Settlements

Such settlements are common in both towns and villages, where the dwellings spread out in several directions from a central point, which is either around a big water body or where many routes join together.

G. Identify the relief features as shown with the help of contours in the following diagrams.

(Take help from the list – saddle, conical hill, concave slope, waterfall, convex slope, dissected plateau, river valley, ridge, plateau)

Ans.

1. Convex slopes
2. Plateau
3. River valley
4. Dissected plateau
5. Conical hill
6. Ridge
7. Waterfall
8. Saddle
9. Concave slope

Chapter 2

STUDY OF TOPOGRAPHICAL SHEET NO. G43S7

Page 24

Ans 1:

a. 2604 b. 2611 c. 2207 d. 2809

Ans 2:

a. (ii) 258 088 b. (i) 227 086 c. (ii) 264 045 d. (i) 267 116

Ans 3:

a. Barren land
b. River
c. Broken ground
d. Sand dunes

Ans 4:

The main occupation for the people of this region is agriculture. The two reasons to support the answer are:

(i) Presence of flat land.
(ii) Drained by river with water channel.

Ans 5:

a. Palm trees
b. Permanent huts
c. Lined perennial wells
d. Lined well

Ans 6:

a. Sand hills
b. Police station
c. Surveyed tree
d. Lime kiln

Ans 7:

a. North West b. South West
c. South d. South West

Ans 8:

a. Overhead tank b. Dry artificial tank
c. A Chhatri d. Power line with poles surveyed

Ans 9:

The different means of transport shown on this part of the Topo sheet are

i. Metalled road
ii. Cart track
iii. Pack track

Ans 10:

a. 3 km b. 7 km c. 3.25 km d. 6 km

Page 26

Ans 1:

a. 3005 b. 3108 c. 3608 d. 3411

Ans 2:

a. 319 107 b. 344 044 c. 348 107 d. 346 071

Ans 3:

a. Scattered or Dispersed
b. Nucleated or Clustered
c. Nucleated
d. Scattered or Dispersed

Ans 4:

a. Broken Ground
b. Prominent Surveyed tree
c. Relative depth of a lined perennial well
d. A Bridge

Ans 5:

The main sources of irrigation in this region are rivers and wells.

Ans 6:

a. A lined perennial well
b. A permanent hut
d. A lined perennial well
e. A palm tree

Ans 7:

a. Cultivable land b. Barren land
c. Cultivable land d. Cultivable land

Ans 8:

a. Radial drainage pattern (Refer Fig. 1.18, Page 16)

b. Mosque

c. Tidal river

d.  Express Highway with toll

Ans 9:

a. North East

b. North West

c. North East

c. North East

Ans 10:

The direction of flow of water in

(i) Sipu river — South West

(ii) Varka Nadi — North West

Page 28

Ans 1:

a. 4204

b. 4206

c. 4111

d. 4311

Ans 2:

a. (ii) 439 107

b. (iii) 410 047

c. (i) 447 114

d. (i) 426 064

Ans 3:

a.  → Demarcated State Boundary

b. ☆ → Tourist site

c. → Church

d. → Single broad gauge railway

Ans 4:

The pattern of settlement in grid squares:

4203 → Scattered/Dispersed

4204 → Scattered/Dispersed

Ans 5:

a. Cultivable Land

b. Forested Area

c. Forested Area

d. Forested Area

Ans 6:

a. Palm trees

b. Pack track

c. A lined perennial well

d. A Masonry Dam

Ans 7:

a. North East
b. South West
c. West
d. North East

Ans 8:

The drainage pattern in grid squares

4308 → Trellised

4107 → Dendritic

Ans 9:

The area in square kilometres of the region enclosed by Eastings 41 to 45 and Northings 07 to 11 is 16 km^2.

Ans 10:

The main occupation of the people in this region is forestry.

The two reasons to support this answer:

(i) Presence of open mixed jungle and fairly dense mixed jungle

(ii) Hilly area with dendritic drainage pattern

Page 30

Ans 1:

a. 2599
b. 2600
c. 2601
d. 2498

Ans 2:

a. 257 016
b. 228 947
c. 236 987
d. 263 003
e. 284 017

Ans 3:

a. Church
b. Surveyed tree
c. Wooded area
d. Tube well
e. Perennial tank

Ans 4:

a. Broken ground
b. Dense jungle
c. Flat sand
d. Barren land
e. Forested area

Ans 5:

On the right bank of river Sipu the main occupation of the people is agriculture.

Reason — Presence of yellow patch.

Animal rearing and mining

Reason — Barren land and open scrub.

On the left bank, the main occupation of the people is agriculture

Reason — Presence of flat land & river with dendritic drainage pattern

Ans 6:

a. Temporary huts
b. Palm trees
c. Palm trees
d. Lined perennial well
e. Power line surveyed

Ans 7:

a. North West
b. North East
c. South East
d. North West
e. South West

Ans 8:

a. 3.75 km
b. 2.75 km
c. 6 km
d. 3.75 km

Ans 9:

a. 5.5 km
b. 8 km
c. 3 km
d. 7 km

Page 32

Ans 1:

a. 3101
b. 3798
c. 3502
d. 3197

Ans 2:

a. (iii) 306 023
b. (i) 358 951
c. (ii) 361 001
d. (i) 357 024

Ans 3:

a. Lined well
b. △ 200 Triangulated station
c. Police station
d. Overhead tank

Ans 4:

The drainage pattern in the area under grid square:

3696 → Trellis

3796 → Radial

Ans 5:

The pattern of settlement in the cultivated area towards the west of the wooded area is Nucleated.

Ans 6:

a. It is the high speed divided highway for through traffic with toll plaza to collect toll tax for maintenance.

b. A Broad gauge railway is a railway with a track gauge broader than standard gauge railways → with a railway station for the boarding and unboarding of passengers.

c. Idgah is a place set apart for public prayers on two chief Muslim festivals.

d. A Veterinary dispensary is the unit of veterinary and Animal Husbandry service delivery mechanism at Block level.

Ans 7:

The pattern of settlement in this region — Nucleated. Its development — It has a metalled road with and without bridges connecting the settlements.

Ans 8:

a. Permanent huts

b. Lined perennial well

c. Metalled road

d. Palm trees

Ans 9:

a. Conical hill

b. Broken ground

c. Cultivable land

d. Broken ground

Ans 10:

a. South East

b. North East

c. South West

d. South East

Page 34

Ans 1:

a. 4197

b. 4402

c. 3994

d. 4501

Ans 2:

a. 398 951

b. 417 975

c. 425 943

d. 412 979

Ans 3:

a.  → Temple

b.  → Causeway

c.  → Contours

d. → Footpath

Ans 4:

a. Cart-track

b. Palm tree

c. Permanent hut

d. Palm tree

Ans 5:

The significance of forests in the life of people living in this region is —

Major products → Extraction of timber

Minor products → Pulp & paper, gum, lac, resin etc.

Ans 6:

The actual map distance between temple west of Manpuriya and Chauhangadh settlement is 3.5 km.

Ans 7:

a. Conical Hill

b. Forested area

c. Cultivable land

d. Forested area

Ans 8:

a. Artificial dry tank

b. Power line with Pylons surveyed

c. Conical hill

d. River with water channel and silt

Ans 9:

a. Trellis

b. Trellis

c. Radial

d. Trellis

Ans 10:

a. South West

b. North East

c. South East

d. North West

Ans 11:

Two prominent physical features are as follows:

A ridge

A Conical hill

Page 36

Ans 1:

a. 2891 b. 2589 c. 2292 d. 2587

Ans 2:

a. (i) 271 933
b. (iii) 256 899
c. (ii) 258 906
d. (i) 211 893

Ans 3:

Canals provide irrigational facility as this area is drained by a river only in its north eastern part.

Ans 4:

From the point of view of transportation Bhakar settlement is well connected with metalled roads and cart-track.

Ans 5:

The pattern of settlement towards the south of Banas river is Nucleated or Clustered.

Ans 6:

a. Sand dunes
b. Island in Banas river
c. Cultivable land
d. Barren land

Ans 7:

a. Palm tree
b. Main power line
c. Palm tree
d. A temporary hut

Ans 8:

a. Trellis drainage pattern (Refer Fig. 1.17, Page 16)
b. Scattered settlement (Refer Fig. 1.21, Page 17)
c.  → Aqueduct
d.  → Road with distance stone

Ans 9:

a. Relative depth of a lined perennial well is 32 m
b. A circuit house
c. An unmetalled road
d. Temporary huts

Ans 10:

a. West
b. South East
c. South West
d. South West

Page 38

Ans 1:

a. 3691 b. 3589 c. 3487 d. 3392

Ans 2:

a. (iii) 313 905
b. (i) 345 857
c. (iii) 365 921
d. (ii) 306 874

Ans 3:

a. → Covered Tank
b. → Huts – temporary
c.  → Streams with track in bed
d. → Veterinary Hospital

Ans 4:

The main pattern of transport around the Badarpura settlement is metalled roads so mostly heavy vehicles can move.

Ans 5:

The reasons to highlight that this region gets seasonal rainfall are as follows:

- Presence of sand dune
- Presence of barren land

Ans 6:

The scale of the map is 1 : 50,000

The total area in sq km is 90 km^2.

Ans 7:

a. 3.5 km
b. 4 km
c. 6 km

Ans 8:

a. South West
b. North West
c. South West
d. North West

Ans 9:

a. River with silt deposits
b. Sand dunes
c. Barren land
d. Sand dunes

Ans 10:

a. Temporary hut
b. Palm trees
c. Earthwork dam
d. Cart track

Page 40

Ans 1:

a. 4286
b. 4485
c. 4592
d. 3888

Ans 2:

a. (ii) 443 861
b. (i) 397 882
c. (iii) 401 921
d. (ii) 403 861

Ans 3:

a.  → Broken ground
b.  → National Highway
c.  → Overhead Tank
d.  → Surveyed Tree

Ans 4:

a. Radial
b. Radial

Ans 5:

a. Permanent hut
b. Metalled road
c. Permanent hut
d. Temple

Ans 6:

a. Broken ground
b. A ridge
c. Sand dunes
d. Sand dunes

Ans 7:

a. Conical hill
b. Post office
c. Mine
d. Poles unsurveyed

Ans 8:

a. A ridge
b. A small hill

Ans 9:

a. Scattered
b. Nucleated

Ans 10:

a. North East
b. South East
c. North West
d. South West

Chapter 3
Study of Topographical Sheet No. G43S10

Page 44

Ans 1:

a. 5032 b. 5333 c. 5438 d. 5330

Ans 2:

a. (i) 487 354
b. (ii) 519 328
c. (iii) 528 348
d. (iii) 536 388

Ans 3:

a. Broken ground
b. Dry Natural tank
c. Dry Natural tank
d. Flat agricultural land

Ans 4:

a. Dendritic
b. Trellis
c. Trellis
d. Trellis

Ans 5:

a. Hospital
b. The relative height of the river bank in 5 m.
c. Dry Natural tank
d. Broken ground

Ans 6:

a. Permanent huts
b. Cart track
c. Unmetalled road
d. Palm tree

Ans 7:

Agriculture is the main occupation of the people living in this region. Two main reasons for this
– Presence of flat yellow patch of land
– Presence of river.

Ans 8:

The two features which make Dantrai settlement more important than the other settlements are
– This is well connected with metalled road.
– Has Police Chowki.

Ans 9:

a. South West
b. South West
c. North
d. South West

Ans 10:

The length of unmetalled road between Dhann and Idarla villages is 8000 m.

Ans 11:

Two important means of transport is Metalled road and unmetalled road.

Significance — Improved trade and commerce because of developed transportation and communication.

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Ans 1:

a. 5631
b. 5938
c. 6233
d. 6137

Ans 2:

a. 616 313
b. 625 338
c, 581 355
dd. 624 385

Ans 3:

a.  → Aqueduct
b.  → Surveyed tree
c. Compact settlement (Refer Fig. 1.20, Page 17)
d. → Unmetalled road

Ans 4:

a. North West
b. South West
c. North West
d. North West

Ans 5:

The various means of transport in this region are

– Metalled road
– Unmetalled road
– Cart track
– Pack track

The impact on economic activities is — Improvement regarding trade and commerce.

Ans 6:

a. Spring
b. Spot height
c. Hospital
d. A weir

Ans 7:

a. Palm trees
b. Pack track
c. Unmetalled road
d. Lined perennial well

Ans 8:

a. River
b. Cultivable land
c. Barren land
d. Hilly area

Ans 9:

a. 7 km
b. 5 km
c. 7.5 km

Ans 10:

The main occupation of the people in this region is agriculture. The reasons are

– Yellow patch, flat land is predominating the area.

– This area is drained by a river.

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Ans 1:

a. 7132
b. 6431
c. 6636
d. 6831

Ans 2:

a. Nucleated
b. Scattered
c. Nucleated
d. Nucleated

Ans 3:

a. Cultivable land
b. Barren land
c. Cultivable land
d. Barren land

Ans 4:

The role of NH 168 is that it is the backbone of road infrastructure and connects all the major cities of India.

Ans 5:

a. 666 364
b. 657 339
c. 664 333
d. 718 386

Ans 6:

The actual length of NH 168 – 10.5 km

Power line with Pylons submerged – 10.5 km

Ans 7:

a. A temple
b. Triangulated height
c. Power line with Pylon surveyed
d. A weir
e. Natural dry tank with embankment
f. Prominent surveyed tree

Ans 8:

a. Permanent hut
b. Power line with Pylons surveyed
c. Cart-track
d. Palm trees

Ans 9:

a. South West
b. North East
c. North East
d. North West

Ans 10:

a. Contour interval is 20 m.
b. R.F. is 1 : 50,000
c. Area is 81 km^2.
d. South West

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Ans 1:

a. 5429 b. 5424 c. 4928 d. 5221

Ans 2:

a. (iv) 544 274
b. (ii) 522 228
c. (i) 494 250
d. (i) 484 267

Ans 3:

a. ◎ → Brick Kiln
b. △ three digit number → Triangulated station
c. → Tramway
d. ⊕ → Veterinary dispensary

Ans 4:

a. 5.25 km
b. Well connected by metalled roads and also the NH 168 is going past it. It also has modern amenities.
c. Reason for seasonal rainfall
   — Broken ground
   — Dry tanks
d. Main sources of irrigation
   – Wells (as rivers do not have water channel)

Ans 5:

a. Permanent hut
b. Palm trees
c. Power line with Pylon surveyed
d. Metalled road

Ans 6:

a. Scattered b. Scattered c. Nucleated d. Scattered

Ans 7:

a. South east
b. South east
c. North
d. North east

Ans 8:

a. Flat sand
b. Cultivable land
c. Cultivable land
d. Cultivable land

Ans 9:

a. Radial
b. Dendritic (5225) and Trellis (5226) both
c. Trellis (5128) and Trellis (5129)
d. Trellis (5328) and Dendritic (5329)

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Ans 1:

a. 5826
b. 6226
c. 5728
d. 5824

Ans 2:

a. (ii) 569 254
b. (i) 625 267
c. (iii) 592 224
d. (i) 607 288

Ans 3:

a. Metalled road
b. Permanent hut
c. Permanent hut
d. Cart-track

Ans 4:

Metalled road is the important means of transport in this region. They have contributed in improving trade and commerce in this region.

Ans 5:

a. Stream/river
b. A River
c. A dissected plateau
d. Barren land

Ans 6:

a. Inspection bungalow 
b. Chhatri 
c. Pack track
d. Power line with poles surveyed

Ans 7:

a. A temple
b. Veterinary hospital/dispensary
c. Dry Natural tank
d. Lined perennial well

Ans 8:

a. Scattered or dispersed
b. Nucleated or clustered
c. Nucleated or clustered
d. Nucleated or clustered

Ans 9:

a. 4.25 km
b. North East
c. It's a raised road built on a swampy or marshy land
d. An artificial channel for conveying water

Ans 10:

The four facilities which have made Anadra an important settlement in this region are:

– Presence of metalled road
– Presence of a diggi
– Power line with Pylon unsurveyed
– Presence of flat cultivable land

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Ans 1:

a. 7021
b. 6527
c. 6924
d. 6822
e. 6721

Ans 2:

a. (i) 685 224
b. 688 212
c. (iii) 676 217
d. (iii) 695 236
e. (iii) 717 251

Ans 3:

a. Cemetery
b. Circuit house
c. Footpath
d. Deserted village
e. Police station –

Ans 4:

The significance of Abu city in the economy of this region is

– Presence of a factory
– Presence of Nakhi Talao and Alwar talao
– Well connected with metalled road
– Presence of Raj Bhawan, PWD, CPWD

Ans 5:

Fine tourist or entertainment centres –

a. Cane dwelling
b. Jain temple
c. Waterfall near Nakhi talao
d. Jai Vilas Palace
e. Raj Bhawan

Ans 6:

a. Pack Track
b. Permanent huts
c. Metalled road
d. Footpath

Ans 7:

a. Dendritic
b. Dendritic
c. Trellis
d. Dendritic/Trellis both

Ans 8:

a. Hilly area with steep slope
b. Forested area
c. Steep slope of a hill
d. Forested area
e. Cultivated land

Ans 9:

a. South West
b. North West
c. South West
d. South West
e. South East

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Ans 1:

a. 4913
b. 5412
c. 5418
d. 4718

Ans 2:

a. (ii) 474 131
b. (iv) 497 158
c. (i) 492 199
d. (iii) 513 158

Ans 3:

a. Metalled road –
b. Broken ground – 
c. Cultivated area – 
d. Veterinary hospital – 

Ans 4:

a. South West
b. North East
c. North West
d. South East

Ans 5:

a. Lined perennial wells
b. A palm tree
c. Cart-track
d. Metalled road

Ans 6:

a. Broken ground
b. Cultivable land
c. Barren land
d. Cultivable land

Ans 7:

a. Right bank
b. Left bank
c. Right bank
d. Right bank

Ans 8:

The drainage pattern in
– 5217 is Dendritic
– 5315 is Radial

Ans 9:

The pattern of settlement in
– 5016 is Nucleated
– 4713 is Nucleated

Ans 10:

The two suitable reasons to justify that the region in the map extract receives seasonal rainfall are
– Open scrub
– Seasonal tank.

Ans 11:

a. 4.25 km
b. 10 km
c. 5 km
d. 5.25 km

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Ans 1:

a. 5717
b. 6014
c. 6117
d. 6219
e. 5813

Ans 2:

a. 565 187
b. 557 150
c. 609 123
d, 591 158
e. 597 146

Ans 3:

a. A dry tank with embankment
b. Light house
c. Fort
d. River - dry with water channel
e. Cart-track

Ans 4:

a. Earthwork dam
b. Permanent hut
c. Lined perennial well
d. Metalled road
e. Pack track

Ans 5:

a. Hilly terrain
b. Cultivable land
c. Cultivable land
d. River

Ans 6:

a. North West
b. North East
c. North West
d. South
e. North West

Ans 7:

The general slope of the land is southwestwards because the contours are present in the eastern part depicting high land feature, yellow patch depicting flat land is seen in the southern and western part as well as decreasing spot heights.

Ans 8:

The drainage pattern is radial.

Ans 9:

a. Scattered/dispersed
b. Scattered/dispersed
c. Scattered/dispersed
d. Nucleated

Ans 10:

The different means of transport available in this region is

– Metalled road
– Pack track
– Cart track

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Ans 1:

a. 6912
b. 6919
c. 6420
d. 6415

Ans 2:

a. (iii) 699 182
b. (i) 678 195
c. (ii) 674 183
d. (i) 697 131

Ans 3:

a. A dissected plateau
b. A steep slope
c. Concave slope
d. Concave slope

Ans 4:

The main source of livelihood in this region is forestry. The two reasons are
– This region is dominated by dense mixed jungle
– and open mixed jungle.

Ans 5:

a. Grid squares 6914 — Dendritic
7015 — Trellis
b. Grid squares 6818 — Dendritic
6918 — Dendritic
c. Grid squares 6614 — Dendritic
6714 — Radial
d. Grid squares 7117 — Dendritic
7118 — Dendritic

Ans 6:

a. Footpath
b. Permanent hut
c. Footpath
d. Metalled road

Ans 7:

a. Temporary hut -
b. Footpath -
c. Toll on road -
d. Earthwork across a river -

Ans 8:

a. North West
b. North West
c. North West
d. North West

Ans 9:

a. Scattered
b. Nucleated
c. Scattered
d. Scattered

Ans 10:

The length of the metalled road in the southern part of the map area is 5 km.

Chapter 5

INDIA — LOCATION, EXTENT AND PHYSICAL FEATURES

A. Answer the following questions very briefly.

1. Which country has population more than India?

Ans. China has population more than India.

2. Name the countries which are larger than India in area.

Ans. Russia, Canada, USA, China, Brazil and Australia.

3. What is the north–south extent of the mainland of India?

Ans. The north–south extent of the mainland of India from Kashmir in the north to Kanniyakumari in the south is about 3,214 kilometre.

4. Name the Union Territories in India.

Ans. Union Territories of India are: Andaman and Nicobar Islands, Chandigarh, Dadra and Nagar Haveli, Daman and Diu, National Capital Territory of Delhi, Jammu and Kashmir, Lakshadweep, Ladakh and Puducherry.

5. Which states form the group of seven sisters?

Ans. The states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura form the group of seven sisters.

6. Name the states which have common land boundary with Pakistan or Bangladesh.

Ans. The Indian states and Union Territory having common land boundary with Pakistan: Union Territory of Jammu and Kashmir, States of Rajasthan, Punjab, and Gujarat

The Indian states having common land boundary with Bangladesh: Assam, West Bengal, Mizoram, Meghalaya, and Tripura

7. Name the important parallel which passes through the middle of India.

Ans. Tropic of Cancer passes through the middle of India.

8. Name the highest peak in the Indian Himalayas.

Ans. Mt. Kanchenjunga (8,598 metres high) is the highest peak in the Indian Himalayas.

9. Name the countries, which have common land boundary with India.

Ans. The land boundary of India is about 15,200 kilometre long and it is common with Pakistan and Afghanistan in the northwest, China, Nepal and Bhutan in the north, Bangladesh and Myanmar in the east.

10. Name the three main divisions of the Northern Mountains.

Ans. The three main divisions of the Northern Mountains are:

1. Himalaya or Himadri
2. Middle Himalaya or Himachal
3. Shiwalik ranges

B. Answer the following questions.

1. Distinguish between Himadri and Himachal.

Ans. **Himadri** range is the highest range in the world. It is more than 6000 metres high. This range has the Mt. Everest is the highest mountain peak in the world. Mt. Kanchenjunga lies in this range. It is the highest peak in the Indian Himalayas. This snow-covered range has many passes, such as Zoji La, Bara Lacha La, Shipki, Niti Pass, Nathu La, Jelep La, Bomdi La, etc.

Himachal has the Pir Panjal, Dhaola Dhar, Mussoorie range, Nag Tibba, etc. The height of these ranges varies between 3,500 to 4,500 metres. The main passes that lie in this area are Pir Panjal and Banihal Pass. The important hill stations located in this area are Shimla, Mussoorie, Naini Tal, Ranikhet, Darjiling, etc.

2. Name any five hills in the north-eastern part of India.

Ans. Naga hills, Manipur hills, Mizo hills, Garo hills, and Khasi hills

3. Distinguish between the Ganga plain and the Brahmaputra plain.

Ans. **The Ganga plain** is the largest part and extends from Yamuna river in the west up to Bangladesh in the east. It covers the states of Uttar Pradesh, Bihar and West Bengal. The western part is the Ganga–Yamuna doab and towards the east is low-lying Rohilkhand. In the middle part, the Ganga river is sluggish and shifts its course. In the lower part, the Ganga and Brahmaputra rivers form the largest delta, Sundarbans delta, in the world. The main tributaries of Ganga are Gomti, Ghaghra, Gandak, Kosi, Yamuna, Chambal, Son, Betwa, etc.

The Brahmaputra plain in the eastern part is drained by the Brahmaputra river and its tributaries. This river is called Tsangpo in Tibet. It enters the Assam valley through the Dihang gorge. There are many marshy tracts in the region. The Brahmaputra river is called the red river, because during floods, the water mixes with red soil of Assam and appears red.

4. What is the latitudinal and longitudinal extent of India?

Ans. India is situated in the northern and eastern hemispheres. The mainland of India extends from about 8° 4′ N to 37° 6′ N latitudes and from about 68° 7′ E to 97° 25′ E longitudes. Thus, the latitudinal and the longitudinal extent of India is about 30° each.

5. Compare the Western Ghats with the Eastern Ghats.

Ans. **The Western Ghats** or **Sahyadris** form the western edge of Deccan plateau. It lies between Tapi valley and Kanniyakumari. The main rivers like the Godavari, Krishna and Kaveri rise from the eastern slopes and flow into Bay of Bengal. The main passes that lie in the Western Ghats are Thal Ghat, Bhor Ghat and Pal Ghat. The Western Ghats join the Eastern Ghats at the Nilgiri hills and the highest point is Doda Beta (2,637 metres high). The highest peak of South India is Anai Mudi (2,695 metres high).

The Eastern Ghats are a series of detached hills lying between Mahanadi river in Odisha and Vaigai river in Tamil Nadu. Godavari valley divides the Eastern Ghats in two parts. Mahendra Giri (1,501 metres high) is the highest peak in northern part. Nallamalai range forms the southern part. Udagamandalam is a hill station at the foot of Doda Beta in the Nilgiris.

6. What is inland drainage?

Ans. Inland drainage is the drainage in which rivers do not reach an ocean or sea but empty their water in a lake or inland sea. In the north of Luni river, in the Rajasthan plain, there is a large area of inland drainage, which has several dry river beds. Sambhar is the largest saline lake in this area.

7. Name any four hill ranges in the Deccan Plateau of India.

Ans. The four hill ranges in the Deccan Plateau of India are Satpura range, Vindhya range, Mahadev and Maikala ranges.

8. Name the hill range between the Narmada and Tapi rivers.

Ans. The Satpura range lies between the Narmada and the Tapi rivers.

9. Describe the location of Great Indian Desert.

Ans. The Great Indian Desert, also known as the Thar Desert, is located partly in Rajasthan state, northwestern India and partly in Punjab and Sindh provinces of Pakistan.

10. Name the main rivers which flow from southwest to northeast in the Central Highlands.

Ans. Narmada River flows from southwest to northeast in the Central Highlands whereas the Chambal, Sind, Betwa and Ken rivers flow from southwest to northwest.

C. On the outline maps of India mark and label the following.

1. States – Assam, Gujarat, Chhattisgarh and Kerala
2. Rivers – Ganga, Brahmaputra, Narmada, Kaveri
3. Coasts – Konkan, Malabar, Coromandel
4. Standard Meridian of India
5. Hill ranges – Naga Hills, Chotanagpur plateau, Nilgiri hills, Vindhya range, Aravali range
6. Water bodies – Andaman Sea, Gulf of Khambhat, Palk Strait, Indian Ocean, Bay of Bengal
7. Cities – Lucknow, Chennai, Chandigarh, Panaji
8. Passes – Nathu La, Bomdi La, Karakoram Pass, Bhor Ghat
9. Neighbouring states of Madhya Pradesh.
10. Peaks – K2, Mt. Kanchenjunga, Anai Mudi, Mahabaleshwar.

Ans. Map Work.

Chapter 6

INDIA – THE CLIMATIC CONDITIONS

A. Give geographical reasons for each of the following:

1. The Konkan coast experiences orographic rainfall.

Ans. Orographic rainfall is produced from lifting of moist air over a mountain. The Konkan coast experiences orographic rainfall because the monsoon winds which blow over the Arabian Sea strike the western side of the Western Ghats resulting in heavy rainfall. By the time these winds reach the Eastern Ghats, they are already dry as they already shed their moisture.

2. Patna receives more rainfall than Delhi.

Ans. Patna receives heavier rainfall than Delhi because the Bay of Bengal branch of Southwest Monsoon goes up the Ganga plan. As it proceeds up the Ganga valley, the amount of rainfall goes decreasing from East to West. Since Patna is located to the east of Delhi, it receives 102 centimetres of rainfall while Delhi gets 50cm of rainfall.

3. The offshore winds are dry during winter months.

Ans. The places which are far away from water bodies experience continental climate, as they are far away from the moderating influence of the water bodies. Thus, such places experience hot summers and cold dry winters.

4. The Central Maharashtra receives less rainfall than the coastal areas in Maharashtra.

Ans. The Arabian Sea branch of the Southwest Monsoon winds is obstructed by the Western Ghats. The windward side of the Sahyadris receives very heavy rain. The leeward side gets lesser rain. This is the reason the coastal areas in Maharashtra receives heavy rainfall, while Central Maharashtra on the leeward side receives less rainfall.

5. Kochi has a lesser annual range of temperature than Lucknow.

Ans. The maximum summer temperature is comparatively lower in the southern parts of India, which is due to the moderating effect of the Arabian Sea and the Bay of Bengal. The northern and central parts of India experience heat waves at this time. This is the reason Kochi has a lesser annual range of temperature than Lucknow.

6. The coastal areas in Tamil Nadu gets most of its rain during the winter season.

Ans. The Southwest Monsoons begin to retreat from the northwestern part of India by the middle of September and continue up to November. The retreating Northeast Monsoons blow from land to sea. These winds pick up moisture while crossing the Bay of Bengal and cause widespread rains in the coastal areas of Tamil Nadu in winter.

7. Mumbai is warmer than Chandigarh in December and January.

Ans. The temperature along the west coast is lower than that prevailing on the east coast, which is due to the Westerly winds. The northern and central parts of India experience heat waves at this time. This is the reason Mumbai is warmer than Chandigarh in December and January.

8. Kerala enjoys the longest rainy season in India.

Ans. Kerala lies in the coastal region surrounded by the Arabian Sea. It also lies in the tropical region and thus receives conventional rainfall. When the monsoon winds blow over the Arabian Sea, they pick up moisture and strike the Western Ghats. Kerala is also prone to storm surges and torrential downpour as a result of cyclones. This results in frequent rainfall and a long rainy season in Kerala.

9. Western Rajasthan receives practically no rainfall from the Arabian Sea branch of Southwest Monsoons.

Ans. Western Rajasthan receives no rainfall from the Arabian Sea branch of the Southwest Monsoons because the Aravali range is parallel to the direction of the Southwest Monsoon as a result it is unable to obstruct the monsoon wind hence not receiving any rain from the Arabian Sea branch of the Southwest Monsoons.

10. Shimla is cooler than Delhi in the months of May and June.

Ans. The places that are located at the higher altitude are cooler than the places located on the plains. Shimla is located at the higher altitude in the lap of the Himalayas, and hence experience cooler climate than Delhi which is located in the plains.

11. A major part of India remain dry during the Northeast Monsoon season.

Ans. During this season the Northeast Trade Winds prevail over a major part of India. These winds blow from land to sea. They are dry and devoid of any moisture and hence do not bring rainfall to most parts of the country.

12. The western coastal plain is more humid than the eastern coastal plain.

Ans. Western coastal plains lie on the windward side of the Southwest monsoon winds. They receive more moisture and rainfall, which is called the orographic rainfall. Whereas Eastern coastal plains are on the leeward side of the Southwest monsoon winds, hence receives less rainfall and is less humid.

B. Given below is the climatic data of five different stations. Study the table and answer the questions that follow.

1.

Months	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Temp. °C	21.1	21.9	24.2	27.5	28.1	26.5	26.1	25.5	26.1	23.8	21.5	
Rainfall in cm	5.6	2.7	1.1	1.8	4.1	4.6	8.2	11.5	12.1	31.8	34.5	14.8

a. What is the annual range of temperature?

b. Name the winds which bring maximum rainfall in this city.

c. Calculate the annual rainfall in this city.

Ans. a. The annual range of temperature =

Maximum monthly mean temperature – Minimum monthly mean temperature

= 28.1 – 21.1 = 7 °C

b. The Northeast Monsoon winds bring maximum rainfall to the city.

c. Annual rainfall = Sum of the rainfall in all the twelve months.

= 5.6 + 2.7 + 1.1 + 1.8 + 4.1 + 4.6 + 8.2 + 11.5 + 12.1 + 31.8 + 34.5 + 14.8

= 132. 8 cm

2.

Months	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Temp. °C	23.5	25.1	27.5	28.7	30.1	30.1	33.7	30.5	30.1	25.5	24.6	
Rainfall in cm	0.6	0.1	1.2	1.4	2.5	45.3	48.1	44.7	42.9	21.7	3.0	0.2

a. What is the total rainfall during the monsoon season?

b. Calculate the mean annual temperature.

c. Does this station have a maritime or a continental climate? Give at least one reason.

Ans. a. The total rainfall during the monsoon season

= 0.6 + 0.1 + 1.2 + 1.4 + 2.5 + 45.3 + 48.1 + 44.7 + 42.9 + 21.7 + 3.0 + 0.2 = 211.7 cm

b. Annual mean temperature (°C)

$$= \frac{23.5+25.1+27.5+28.7+30.1+33.7+30.5+30.1+25.5+24.6}{12}$$

$$= \frac{279.3}{12} = 23.28\ °C$$

c. This station has a maritime climate as there is less temperature variation over twelve months.

C. Answer the following questions briefly.

1. What type of climate is experienced in India?

Ans. India experiences a typical tropical monsoon type of climate.

2. What are the main elements of weather and climate?

Ans. The main elements of weather and climate are temperature, atmospheric pressure, the direction and velocity of winds and precipitation.

3. Name the factors which influence the climate of a place.

Ans. The factors which influence the climate of a place are: Latitudinal Extent, Altitude of the Place, The Himalaya Mountain Ranges, Presence of Relief Features, Influence of the Water Bodies, Prevailing Winds, Upper Air Circulation, Tropical Cyclones and Western Disturbances, El-Nino Effect, and La-Nina Effect.

4. How do latitude and altitude influence the climate of a place? Give one example in each case.

Ans. The latitudinal extent is an important factor which influences the climatic conditions of a region. The southern half of India lies in the tropical belt close to the Equator, whereas the northern half is above the Tropic of Cancer. These two parts of India enjoy different climatic conditions due to their location and latitudinal extent.

The temperature decreases with increase in height. For every 1000 metres of ascent, there is a drop of about 6 °C in temperature. Due to this reason, the places in the mountains are cooler than in the plains.

5. Name the main sources of rain in Punjab and Tamil Nadu during the winter season.

Ans. During winter, Punjab receives rainfall due to western disturbances whereas Tamil Nadu receives winter rain due to Northeast monsoon winds.

6. Name any two main areas which receive rainfall from the two types of cyclonic systems.

Ans. Two types of cyclonic systems that affect India are the tropical cyclones and the temperate cyclones. While the tropical cyclones bring rainfall to West Bengal and Odisha; the temperate cyclones bring rainfall to Delhi and Punjab.

7. What is the direction of the monsoon winds at the time of onset and retreat?

Ans. The monsoons are seasonal winds that change their direction of flow with the change of season. The monsoon winds blow mostly from sea to land during the summer and from land to sea during the winter season. The Southwest Monsoon season in India starts with the onset of the Southwest Monsoon Winds in June and continues till the middle of September. After crossing the equator, the Southeast Trade Winds blow from southwest to northeast.

The retreating Northeast Monsoons blow from land to sea. The Southwest Monsoons begin to retreat from the northwestern part of India by the middle of September and continue up to November.

8. Name the distinct seasons experienced in India and their duration.

Ans. The seasons experienced in India and their duration:

1. The Summer Season – March to May
2. The Monsoon Season – June to September

3. The Retreating Monsoon Season – October to November
4. The Winter Season – December to February

9. What is the extent of hot weather season in India?

Ans. The hot weather season begins in March and continues till June. During these months the heat belt shifts from south to north due to the apparent northward movement of the Sun. Sometimes the summer season is also referred to as the pre-monsoon period.

10. What is the burst of the monsoons?

Ans. The Southwest Monsoon Winds are rain-bearing strong winds and cause thunder, lightning and heavy downpour. This sudden onset of monsoons is known as the burst of the monsoons.

11. Which parts of India remain dry in the rainy season, i.e. from June to September?

Ans. The eastern coastal belt, particularly in Tamil Nadu, remains dry from June to September. The Tamil Nadu coast lies in the rainshadow area of the Arabian Sea branch and is parallel to the Bay of Bengal branch.

12. Mention two differences in the climatic conditions which prevail over Goa and Delhi in the month of June.

Ans. Delhi has a humid subtropical climate whereas Goa has a tropical monsoonal climate. Goa being in the tropical zone and near the Arabian sea has a hot and humid climate for most of the year. It is mainly dry in Delhi with occasional rain whereas in Goa, hot summers give way to cool monsoon and it's humid due to heavy cloud cover. The average temperature as observed in Delhi is quite high, around 40 °C in June whereas in Goa, temperature is around 30 °C and so quite pleasant in the month of June.

13. Name two main features of the monsoon winds in India.

Ans. The monsoon winds are the prevailing winds over the whole of India. The complete reversal in the direction of monsoon winds brings a sudden change in the seasons. The southwest summer monsoons bring rainfall to the entire country whereas the northeast winter monsoons travel from land to sea and do not cause much rainfall except along the Coromandel Coast.

14. What is the main source of rainfall in Tamil Nadu during the winter season? How does Tamil Nadu benefit from it?

Ans. The main source of rainfall in Tamil Nadu during the winter season is the trade winds coming from the north east to the state. Due to the temperate cyclones coming from the Mediterranean sea, these cyclonic rains are beneficial to crops of wheat and barley. The rice cultivation in Tamil Nadu depends on winter rainfall.

15. What type of climate is experienced in the Northern Plains of India and state its two main features?

Ans. The northern half which is above the Tropic of Cancer lies in the temperate belt. This part is not only away from the Equator, but also away from the moderating influence of the water bodies. Thus, such places experience hot summers and cold dry winters. Northern plains experience continental type of climate as it is far away from the oceanic effect. The main characteristics of this type of climate is that it experiences extremes of temperature in the months of summer and winter, i.e. it is extreme hot in summer and extreme cold in winter.

D. Write short notes on each of the following (in about 30 words).

Ans.

1. **EL-Nino effect:** El-Nino is a narrow warm current, which temporarily replaces the cold Peru current and causes floods and droughts in the tropical regions. The warming of water in the Pacific Ocean, affects the monsoon winds in the Indian Ocean.
2. **Retreating monsoons:** The Southwest Monsoons begin to retreat from the northwestern part of India by the middle of September and continue up to November. During this period, the low pressure belt is gradually replaced by high pressure, which results in the retreating of monsoons.

3. **Western disturbances:** The fine weather conditions during the winter season are disturbed by the inflow of depressions from the west and the northwest. These low pressure disturbances are also called the Western Disturbances. They originate in West Asia in the region near the Mediterranean Sea. They travel eastwards and enter the Indian Subcontinent. The Western Disturbances cause light rain in the Northern Plains and snowfall in the Northern Mountains. The Western Disturbances are generally active between December and February.
4. **La-Nina effect:** La-Nina usually follows a strong El-Nino. Sometimes the Trade Winds become so strong that they cause accumulation of cold water in the central and eastern parts of Pacific Ocean. This event is called La-Nina. Its influence is just opposite of El-Nino. In India, this can cause very heavy monsoon showers.
5. **Kalbaisakhi:** In the eastern and northeastern parts of India, violent storms are experienced. Their direction is mainly from the northwest and are thus called the Norwesters. The hail storms are accompanied by heavy showers. They cause damage to standing crops, trees, buildings, livestock and even lead to loss of human lives. The Norwesters occur in the month of Baisakh, and thus are locally known as **Kalbaisakhi** in Bengal and **Bardoichila** in Assam.
6. **Inter Tropical Convergence Zone:** The Southeast Trade Winds in the Southern Hemisphere and the Northeast Trade Winds in the Northern Hemisphere meet each other near the equator. The meeting place is called the **Inter Tropical Convergence Zone** (ITCZ). This is the region of ascending air, maximum clouds and heavy rainfall.
7. **Halley's view about monsoons:** In AD 1686 Halley, an Englishman, was of the view that the monsoons are caused by the differential heating of the land and sea. It causes contrast in the atmospheric pressure, which develops a wind that blows from the sea to the land. He conceived the concept of the summer and winter monsoons.
8. **Mango showers:** Towards the close of the summer season thunderstorms occur in Kerala and the adjoining parts of Karnataka and Tamil Nadu, particularly during evenings and nights. These are the pre-monsoon showers, which are locally known as the **'mango showers'**. They are so called because they help in the early ripening of mangoes.
9. **October heat:** The months of October and November are a period of transition from the hot rainy season to the dry winter conditions. Due to high temperature and humidity, the weather becomes oppressive and is commonly known as the 'October Heat'.
10. **Upper Air Circulation:** The jet stream in the upper air system influences the Indian climate. At a height of about 10 to 14 kilometres, above the subtropical high pressure belt, a different pattern of air circulation is observed. These winds blow from west to east, north of the Himalaya mountains and roughly parallel to the Tibetan Plateau. These are called **Jet Streams**.

E. Answer the following questions.

1. Describe the Air Mass theory about the monsoons.

Ans. The Southeast Trade Winds in the Southern Hemisphere and the Northeast Trade Winds in the Northern Hemisphere meet each other near the equator. The meeting place is called the **Inter Tropical Convergence Zone** (ITCZ). This is the region of ascending air, maximum clouds and heavy rainfall. The ITCZ shifts north and south of the equator with the change of season. During the summer season, with the apparent migration of the Sun northwards, the ITCZ shifts northwards. Thus, the Southeast Trade Winds cross the equator and blow in the southwest to northeast direction under the influence of the Coriolis force. These displaced Trade Winds are called the Southwest Monsoons.

2. Distinguish between the westerly and easterly jet streams.

Ans. The **westerly jet stream** is bifurcated by the Himalayas in the northern and southern branches. The northern branch blows along northern edge of the Himalayas. The southern branch blows eastwards along the southern slopes of the Himalayas, and influences the winter weather conditions in India. It brings the Western Disturbances from the Mediterranean region to the Indian Subcontinent. Winter rains and heavy snowfall in hilly regions are caused by Western Disturbances. This is followed by very cold weather in the Northern Plains of India.

The **easterly jet streams** are due to the reversal in the upper air circulation, caused by the northward shift of Sun in summer season. It is mainly caused by the heating of the Tibet Plateau. This leads to the development of easterly cold jet stream over Peninsular India. The easterly jet stream helps in the sudden onset of the southwest monsoons.

3. How does Himalayan mountains influence the climate of India?

Ans. The Himalaya mountain ranges along with its eastern and western offshoots act as an effective climatic barrier. They protect India from the extremely cold winds which originate near the Arctic Circle and blow over Central Asia. During the summer season, the Himalaya mountain ranges check the moisture laden monsoon winds and help in bringing plenty of rainfall in India. In the absence of Himalaya mountain ranges, the climate of India would become hot and dry during the summer season and cold and dry during the winter season. Thus, the Himalaya mountain ranges have helped in developing a typical tropical monsoon type of climate in India.

4. What are the main features of the tropical monsoon type of climate in India?

Ans. In northern part of India, winter is warmer than other areas in the same latitude. Thus, the area north of Tropic of Cancer is also treated as Tropical region. India experiences a typical tropical monsoon type of climate.

Main features of the tropical monsoon type climate are:

In tropical monsoon type climate, there are two dry seasons with low rainfall. For example in India, summers and winters are dry with only little rainfall. While northern parts of the country receive little rainfall during the summer season due to cyclonic depression, Tamil Nadu receives rainfall during winters. Rest of the country experiences hot and dry summers and cool and dry winters.

There is a distinct rainy season with very high rainfall. During the monsoon season in India many parts of the country receive rainfall as high as 200 centimetres. However, some parts of the country like western Rajasthan, western Gujarat, Punjab and Haryana receive very little rainfall due to relief features. Rainfall in the tropical monsoon climate is seasonal in nature and is often irregular and uneven. There is high annual temperature in the tropical monsoon type climate.

5. What do you understand by the concept of the annual cycle of seasons?

Ans. The climatic conditions prevailing in India can be described in terms of an **annual cycle of seasons**, which has the following four distinct seasons.

1. The Summer Season – March to May
2. The Monsoon Season – June to September
3. The Retreating Monsoon Season – October to November
4. The Winter Season – December to February

6. Describe the temperature conditions during the summer season in India.

Ans. The temperature starts rising by the middle of March and by mid-May, the mercury may touch 41 to 44 °C. In the north-western part, the temperature soars to 48 °C. The highest temperature is recorded in May, but in certain regions, June is the hottest month. Even the minimum temperature at night rarely

falls below 20 °C. The daily range of temperature is also very high. The maximum summer temperature is comparatively lower in the southern parts of India, which is due to the moderating effect of the Arabian Sea and the Bay of Bengal. The temperature along the west coast is lower than that prevailing on the east coast, which is due to the Westerly winds. The northern and central parts of India experience heat waves at this time.

7. Explain any two major characteristics of the winter season in Northern India.

Ans. Usually, the cold weather season begins in mid-November and continues till mid-March. December, January and February are the winter months almost all over India, especially in the northern part.

Temperature Conditions: The temperature remains quite low during the winter months. January and February are the coldest months. The days are warm and nights are cold. Slight frost is experienced at places in the hills. The mean daily temperature is below 20 °C over most parts of northern India. The night temperatures are generally below freezing point, especially in the hills.

Pressure, Winds and Precipitation: The high air pressure over large parts of India is due to the low temperature conditions. The wind starts blowing from the high pressure area of the northwest to the low pressure area of the southeast. The velocity of the wind is low due to low pressure gradient. During this season the Northeast Trade Winds prevail over a major part of India. These winds blow from land to sea and hence, the season is dry.

8. What is the extent of summer, winter and rainy seasons in India?

Ans. Usually the hot weather season begins in March and continues till June. During these months the heat belt shifts from south to north due to the apparent northward movement of the Sun. The temperature starts rising by the middle of March and by mid-May, the mercury may touch 41 to 44 °C. In the northwestern part, the temperature soars to 48 °C. The highest temperature is recorded in May, but in certain regions, June is the hottest month.

Usually, the cold weather season begins in mid-November and continues till mid-March. December, January and February are the winter months almost all over India, especially in the northern part.

The Southwest Monsoon season in India starts with the onset of the Southwest Monsoon winds in June and continues till the middle of September. This is called the **rainy season**. The duration of the rainy season goes on decreasing from south to north and from east to west. In the extreme northwest it is only for two months.

9. What parts of India are influenced by the Bay of Bengal branch of Southwest Monsoon winds?

Ans. After reaching the Himalayan foothills, the Bay of Bengal branch of Southwest Monsoon wind is again deflected towards the west and causes heavy rains in the Northern Plains of India. Mawsynram, about 16 kilometres west of Cherrapunji and located on the crest of the Khasi Hills, receives the highest average rainfall in the world. A part of the Bay of Bengal branch moves up the Brahmaputra Valley and causes widespread rains in the northeastern India.

10. Describe the main features of rainfall in India.

Ans. The main features of rainfall in India are:

- The extremes of humidity and rainfall are experienced almost everywhere.
- About 75 per cent of the total annual rainfall is due to the Southwest Monsoon winds during the period from June to September.
- The rainfall from the monsoon winds is highly variable and quite unreliable.
- The monsoon winds may reach India much before its due date or may be considerably delayed.
- The total amount of rainfall is either more than normal or much less than the normal.

- Some parts of the country always face either the danger of floods due to excessive rainfall or drought and famine conditions due to scanty rainfall.
- The variability of rainfall in amount, time and space creates unstable conditions for agriculture, which hampers the economy.
- The rainfall occurs for a few months in the year, i.e. from June to September (the season of the Southwest Monsoons).
- The rainfall is basically torrential in nature. Even in the rainy season of about four months, the actual rainy days are 40 to 45 only.
- The heavy downpour occurs from cyclones, which originate in the Arabian Sea and the Bay of Bengal. It results in floods and excessive soil erosion.
- The distribution of rainfall is largely controlled by the relief features.
- The economy and the lifestyle of the people depend largely on the amount and distribution of rainfall, as the whole country is predominantly agrarian.

11. Explain the phenomena and mechanism of the monsoon winds.

Ans. The monsoons are seasonal winds that change their direction of flow with the change of season. The monsoon winds blow mostly from sea to land during the summer and from land to sea during the winter season. The monsoon winds are characterised by a complete reversal in the direction of the prevailing winds between January and July over the Indian Subcontinent. Several attempts have been made to explain the mechanism of the monsoons, but no satisfactory explanation is available till date.

In AD 1686 **Halley**, an Englishman, was of the view that the monsoons are caused by the differential heating of the land and sea. It causes contrast in the atmospheric pressure, which develops a wind that blows from the sea to the land. He conceived the concept of the summer and winter monsoons. This concept dominated the scene for about three centuries.

Nowadays, the modern theories based on **air masses** and **jet stream** are becoming more relevant.

12. What are the main features of the Southwest Monsoon season?

Ans. The Southwest Monsoon season in India starts with the onset of the Southwest Monsoon winds in June and continues till the middle of September. This is called the rainy season. The duration of the **rainy season** goes on decreasing from south to north and from east to west. In the extreme northwest it is only for two months.

The Southwest Monsoon winds, as they blow from the Indian Ocean, are moisture laden. India receives bulk of its rainfall during the Southwest Monsoon season. The normal date of onset in the Andaman and Nicobar Islands is 20 May, while in Kerala it is 1 June every year. The Southwest Monsoon winds are rain-bearing strong winds and cause thunder, lightning and heavy downpour. This sudden onset of monsoons is known as the burst of the monsoons.

The monsoon winds are known for their vagaries and uncertainties. The dry and wet spells cause heavy floods in one part and may be responsible for droughts in the other. The monsoon winds are often found to be irregular in their arrival as well as retreat, thus dislocating the farming schedule of the millions of farmers in India.

13. How does the location of big water bodies influence the climate of different places? Give at least one example.

Ans. The water bodies surrounding India, i.e., the Indian Ocean, the Bay of Bengal and the Arabian Sea, exert moderating influence on the climatic conditions. These water bodies provide much needed moisture to the summer monsoons, which provide heavy rainfall in India.

The places which are far away from water bodies experience **continental climate**, as they are far away from the moderating influence of the water bodies. Thus, such places experience hot summers and cold dry winters.

The climate of the coastal areas is also modified by the influence of these water bodies. In contrast the coastal areas enjoy almost the same type of climatic conditions throughout the year.

14. How does relief influences the distribution of rainfall in India?

Ans. The relief features of India affect the temperature, air pressure, direction and speed of wind and the amount and distribution of rainfall. The windward side of Western Ghats and Assam receive heavy rainfall during the summer months, whereas the southern plateaus remain dry or get less rainfall due to its leeward situation along the Western Ghats.

15. Describe the progress of monsoon winds over India during the rainy season.

Ans. The Southwest Monsoon winds, as they blow from the Indian Ocean, are moisture laden. India receives bulk of its rainfall during the Southwest Monsoon season. The normal date of onset in the Andaman and Nicobar Islands is 20 May, while in Kerala it is June 1 every year.

The progress of the monsoon winds beyond Kerala is in the form of two branches – the **Arabian Sea branch** and the **Bay of Bengal** branch. The Arabian Sea branch of the Southwest Monsoons is more powerful than the Bay of Bengal branch. The Arabian Sea branch advances slowly, while the Bay of Bengal branch advances rather rapidly.

On reaching the foothills of eastern Himalayas, the Bay of Bengal branch is deflected westwards and advances to the Northern Plain. By June end, the monsoon winds are established over most parts of India.

The Arabian Sea branch of the Southwest Monsoon winds is obstructed by the Western Ghats. The windward side of the Sahyadris receives very heavy rain. The leeward side gets lesser rain. One part of the Arabian Sea branch reaches Narmada–Tapi basin and moves further to central India. Another part strikes the Saurashtra Peninsula and the Kachchh. Then it moves in a northeasterly direction parallel to the Aravali Range in the Western India. The Aravali Range lies parallel to the direction of the monsoon winds. Thus, in the absence of an obstruction, the monsoon winds move further north without causing much rainfall in the west. In Punjab, Haryana and other northwestern parts, the Arabian Sea branch of the Southwest Monsoons joins the Bay of Bengal branch. These two branches together cause rains in the Western Himalayan region.

The Bay of Bengal branch of the Southwest Monsoon Winds is directed towards the coast of Myanmar and parts of southeast Bangladesh. The Arakan Hills along the coast of Myanmar deflect these winds towards India and Bangladesh. Thus, the monsoon winds enter West Bengal and Bangladesh from southeast instead of southwest direction. After reaching the Himalayan foothills, it is again deflected towards the west and causes heavy rains in the Northern Plains of India. Mawsynram, about 16 kilometres west of Cherrapunji and located on the crest of the Khasi Hills, receives the highest average rainfall in the world.

A part of the Bay of Bengal branch moves up the Brahmaputra Valley and causes widespread rains in the northeastern India. The rainfall in the Northern Plains of India decreases from east to west. During the months of July and August, there is a tendency to have spells of dry weather. It is called **a break in the monsoons**. The rainy season comes to an end by the middle of September in the major parts of India.

The Southwest Monsoons begin to retreat from the northwestern part of India by the middle of September and continue up to November. During this period, the low pressure belt is gradually replaced by high pressure, which results in the retreating of monsoons.

F. On an outline map of India, mark and label the following.

1. Direction of Southwest Monsoon winds
2. Areas remaining dry during the rainy season, i.e. between June to September
3. Regions affected by the tropical cyclones
4. The onset and withdrawal of monsoon winds

Ans. Map Work

Chapter 7

INDIA — SOIL RESOURCES

A. Distinguish between the following.

1. Residual and Transported soils

Ans. The soils formed due to prolonged weathering of rock and the broken rock materials do not move away or transported by any agent, then these soils are called the **residual soils** or **in situ**. These residual soils are formed in their original position and include black, red and laterite soils.

In some cases weathered or broken rocks are transported to other places by the agents of denudation, such as wind, running water or glacier. These transported sediments are deposited in river valleys or flood plains, to form the **transported soils**, which include the alluvial soils.

2. Horizon B and Horizon C

Ans. The process of soil formation gives rise to well-developed horizontal layers in the soil profile. These layers are also called soil horizons. The soil horizons are marked as A, B, C and D from the uppermost layer of the soil to the parent rock below.

Horizon B (subsoil) is just below the topsoil in which sand, silt and clay is found. This layer has more mineral content than Horizon A, but has limited organic matter. Horizon A and B together form the real soil. **Horizon C (rock fragments)** has small pieces of rocks, which are not affected by the biological processes. The true soil develops from these rock materials.

3. Texture and Structure of soils

Ans. The size of rock or dust particles, which may vary from gravel, sand, silt to fine clay in the soil, define the **texture of the soil**. The loamy soils have a mixture of sand, silt and clay.

The **structure of the soil** refers to the manner in which the soil particles are arranged or grouped. Soils with well-developed structure do not get eroded easily.

4. Sheet erosion and Gully erosion

Ans. When the entire top sheet of the soil is carried away, leaving behind barren rocks, it is called **sheet** or **surface erosion.** Sometimes rainwater forms the finger-shaped grooves, called rills in the soil. When these rills get enlarged, they form deep gullies, which convert into ravines and badlands. It is called **gully erosion.**

5. Contour ploughing and Contour bunding

Ans. **Contour ploughing** involves the ploughing of land along the contours or across the slope of the land. It helps in checking the flow of water. It can reduce the run-off, so that the plants get more water.

Terracing along the mountain slopes is one of the oldest methods of soil conservation along the hill slopes. The slope of the hill is cut into a series of terraces. There is enough level land on terrace for cultivation. It checks the flow of water, promotes absorption of water by soil and thus reduce erosion. This is called **terracing and contour bunding**.

6. Deforestation and Afforestation

Ans. **Deforestation** or the practice of felling trees is one of the factors that causes soil erosion. The best way to conserve soil is to increase area under the forests. It is called **afforestation**. New trees should be planted in the areas of soil erosion and the old ones must be protected. Trees should be planted in rows, especially in dry areas to avoid soil erosion. These trees reduce the speed of winds which can erode the soil cover.

B. Give reasons for each of the following.

1. Alluvial soils are extremely fertile.

Ans. The alluvial soils are extreme fertile as they have adequate amount of potash, phosphoric acid and lime. They are composed of fine particles of sand, silt and clay, called loam and alluvium. They are also soft and porous and thus easily tillable and are best suited for irrigation due to their softness and fertility. These soils can produce a variety of kharif and rabi crops, such as rice, wheat, maize, sugar cane, tobacco, cotton, jute, oilseeds and pulses.

2. Khadar are more fertile than Bangar.

Ans. The alluvial soils are of two types – old alluvium called bangar and new alluvium called khadar. Khadar soils are more fertile than the bangar soils, as khadar are easily replenished by the recurrent floods in the rivers. Khadar soil is sandy and light in colour, while bangar soil is clayey and dark in colour. Khadar soils are finer in texture, while the bangar soils are coarse in texture. Thais is the reason khadar soils are more fertile than bangar soils.

3. Different regions in India have different types of soils.

Ans. India is a big country with varied conditions of relief features, composition of rocks, climatic conditions and natural vegetation. Thus, the soils in different regions of India vary from place to place and also differ in colour, composition, texture, structure and fertility.

4. The red soils are red in colour.

Ans. Most of the red soils have been formed due to the weathering of igneous (ancient crystalline) and metamorphic rocks of the highlands in the peninsular plateau region of India. The red colour of the soil is due to high percentage of iron oxide present in the soil.

5. Black soil is largely found in the Deccan Trap region.

Ans. The black soils have been formed due to the weathering of lava rocks, which were formed due to the cooling and solidification of lava spread over large areas during volcanic activity in the Deccan Plateau. This is the reason the black soils are mostly found in Deccan Trap region.

6. The conservation of soil is very important.

Ans. Soil is our most valuable asset and no other gift of nature is so important for human life as soil. A healthy agricultural system is linked with the healthy soil. Thus, there is an urgent need not only to conserve our soil, but also prevent soil erosion. Actually, preventing soil erosion is as good as conservation of soils. Soil conservation includes all those measures which help in preventing the soil from erosion and exhaustion.

7. The soil erosion is mostly due to human activities.

Ans. Soil erosion is the gradual removal of the topsoil cover by natural agencies, such as water, wind, etc. and also by human interference. Factors which cause soil erosion include mostly human activities such as deforestation, overgrazing mainly by sheep and goats, shifting agriculture by tribals, unscientific farming techniques, diversion of natural drainage system and unscrupulous mining activities.

8. The laterite soils are not suitable for cultivation.

Ans. The laterite soils are porous and have a coarse texture and cannot retain moisture. They are composed of gravel of red sandstone and small quantity of clay. They are poor in lime, silica, potash and nitrogen, but have high contents of phosphates. These soils are rich in oxides of iron and aluminium compounds. Humus is reduced by bacteria which flourishes in high temperature. The laterite soils are less fertile due to intensive leaching. Leaching is a process in which heavy rains either wash away the fertile part of the soil or the nutrients in the soil are percolated downwards. Thus, these soils are of low value for crop production.

C. Answer the following questions briefly.

1. Name at least four methods for controlling soil erosion.

Ans. Preventing soil erosion is as good as conservation of soils. Following methods are normally adopted for the prevention of soil erosion and conservation of soil:

Afforestation: The best way to conserve soil is to increase area under the forests. New trees should be planted in the areas of soil erosion and the old ones must be protected. Trees reduce the speed of winds which can erode the soil cover.

Check on Overgrazing: The animals, especially sheep and goats overgraze in grasslands and forests. They also move freely in the cultivated fields and thus break the soil with their hoofs. This should be controlled by either growing fodder crop or developing separate grazing grounds.

Constructing Dams and Barriers: Most of the rivers during the rainy season cause heavy erosion of the soil. This can be prevented by controlling the flow of rivers by building dams across the rivers.

Check on Shifting Cultivation: Some tribals in India are still practicing the ancient system of shifting cultivation. They should be persuaded to switch over to settled agriculture. Shifting cultivation expose the soil for erosion.

2. What are the disadvantages of laterite soils?

Ans. The laterite soils are porous and have a coarse texture. These soils cannot retain moisture. They are poor in lime, silica, potash and nitrogen, but have high contents of phosphates. Humus in laterite soils is reduced by bacteria which flourishes in high temperature. These soils are less fertile due to intensive leaching. Thus, these soils are of low value for crop production. The laterite soils are mostly acidic in nature, because the alkalis are leached away from the soils.

3. State two main advantages of red soils.

Ans. The red colour of the soil is due to high percentage of iron oxide and the two main advantages of red soil are:

- The texture of the red soils varies from sandy to clayey and majority of them are loamy.
- With proper doses of fertilizers and irrigation, red soils are suitable for growing cotton, wheat, rice, pulses, millets, oilseeds, tobacco, fruits, potatoes and vegetables.

4. Name any four crops which can be grown in alluvial soils.

Ans. The alluvial soils can produce a variety of kharif and rabi crops, such as rice, wheat, maize, sugar cane, tobacco, cotton, jute, oilseeds and pulses.

5. Describe three characteristics of black soils.

Ans. Three characteristics of black soils are:

- The black soils are formed at the place of their origin and are thus called the residual soils.
- The black soils are made up of extremely fine textured clayey materials. The colour of the soils varies from black to chestnut brown.
- The black soils are well known for their capacity to hold moisture in its subsoil in any season. Thus, the black soils are suitable even for dry farming.

6. What climatic conditions are responsible for the formation of laterite soil?

Ans. The laterite soils have been formed under conditions of high temperature and heavy rainfall, with alternate wet and dry periods. Such climatic conditions help in the leaching of soil. Leaching is a process in which heavy rains either wash away the fertile part of the soil or the nutrients in the soil are percolated downwards. In this process lime and silica are leached away.

7. Name the soil which is sticky when wet and develop cracks whey dry.

Ans. During the rainy season, the black soils expand when wet and becomes sticky. It is difficult to till the wet

soils as the plough gets stuck in the mud. During the hot dry season, the surface of black soils develops deep cracks, which helps in the circulation of air.

8. What type of soils is most widespread in India?

Ans. The alluvial soils cover about 45 per cent of the total land area of India. The alluvial soils are found in the Northern Plains of India, which extends from Punjab in the west up to West Bengal and Assam in the east. Some alluvial soils are also found in the deltas of Mahanadi, Godavari, Krishna and Kaveri rivers along the eastern coast of Peninsular India. The northern part and coastal areas of Gujarat also have some deposits of alluvial soils.

9. Name the various types of soils found in India.

Ans. The various types of soils found in India are:

1. Alluvial soils
2. Black soils
3. Red soils
4. Laterite soils

10. What type of soil is suitable for raising plantation crops?

Ans. When laterite soils are manured and timely irrigated, one can grow a variety of plantation crops at higher elevations, such as tea, coffee, rubber, coconut, cinchona, arecanuts, etc. In the low lying areas rice, sugar cane, cashew nuts, millets, etc. can be grown.

11. Name the crops that can be grown in the black soil.

Ans. The black soils can produce a variety of crops, such as cotton, sugar cane, wheat, millets, oilseeds, gram and tobacco. With proper irrigation facilities, even rice can be grown in black soils.

12. Name any three states where alluvial soil is found.

Ans. The alluvial soils are found in the northern plains of India, which extends from Punjab in the west up to West Bengal and Assam in the east.

D. Answer the following questions.

1. Describe the main characteristics of black soils.

Ans. **The main characteristics of black soils are:**

- The black soils are formed at the place of their origin and are thus called the residual soils.
- The black soils are made up of extremely fine textured clayey materials. The colour of the soils varies from black to chestnut brown.
- The black soils are well known for their capacity to hold moisture in its subsoil in any season. Thus, the black soils are suitable even for dry farming.
- During the hot dry season, the surface of black soils develops deep cracks, which helps in the circulation of air.
- During the rainy season, the black soils expand when wet and becomes sticky. It is difficult to till the wet soils as the plough gets stuck in the mud. Actually, the black soils should be tilled immediately after the first shower.
- The black soils are rich in iron, calcium, alumina, potash, carbonates, magnesium, lime and humus. These soils are generally poor in nitrogen, phosphorus and organic matter.
- The black soils are deep and very fertile in river valleys and lowlands, but have low fertility in the uplands.

- The black soils can produce a variety of crops, such as cotton, sugar cane, wheat, millets, oilseeds, gram and tobacco. With proper irrigation facilities, even rice can be grown in black soils.

2. Give a geographic term for each of the following:

a. The layer of broken rocks on the Earth's surface

Ans. The layer of broken rocks on Earth's surface is called **regolith**.

b. Vertical section of soil from surface to parent rocks

Ans. A vertical section of soil from the surface to parent rocks is called the **soil profile.**

c. The manner in which the soil particles are arranged

Ans. The **structure of the soil** refers to the manner in which the soil particles are arranged.

d. Alluvial deposited on the higher side of river valleys

Ans. Bangar is found on the higher side of the river valleys.

3. With reference to laterite soils in India, answer the following questions.

a. Name two states where it is mostly found.

Ans. Odisha, Maharashtra

b. Give two main advantages of this type of soil.

Ans.
- In some areas, the laterite soils support pastures and scrub forests.
- The laterite soils provide valuable building materials, which are very durable.

c. What crops can be grown in laterite soils?

Ans. When laterite soils are manured and timely irrigated, one can grow a variety of plantation crops at higher elevations, such as tea, coffee, rubber, coconut, cinchona, arecanuts, etc. In the low lying areas rice, sugar cane, cashew nuts, millets, etc. can be grown.

d. Why are laterite soils less fertile?

Ans. The laterite soils are less fertile due to intensive leaching. Thus, these soils are of low value for crop production.

4. Answer the following questions with respect to soils in India.

a. Name the areas where regur soils are found.

Ans. The black soil is locally called **regur**. The black soils are mostly found in **Deccan Trap**, which covers large areas in Maharashtra, Gujarat and western Madhya Pradesh. This type of soil is also found in some parts of Godavari and Krishna river valleys, covering parts of Andhra Pradesh, Telangana, Karnataka and Tamil Nadu.

b. Name two main uses of alluvial soils.

Ans.
- The alluvial soils are soft and porous and thus easily tillable.
- The alluvial soils are best suited for irrigation due to their softness and fertility.

c. What is significance of soil as a natural resource?

Ans. Soil, which is the top covering of Earth's surface, is a valuable natural resource. Its fertility determines the crop-productivity and agricultural production, through which we get food and essential raw materials.

d. How are the alluvial soils formed?

Ans. The rivers which originate from the Himalayan mountains bring with them a large amount of sediments. These sediments are deposited in the river valleys and in the flood plains. These sediments are composed of fine particles of sand, silt and clay. These are called **loam** and **alluvium**. Thus, the parent rock material of alluvial soils is of transported origin.

5. What is the effect of soil erosion in our country?

Ans. In India, it is estimated that about 25 per cent of farmland is exposed to wind and water erosion. The extent of soil erosion is increasing in spite of our efforts to check soil erosion. In fact soil erosion is the first enemy of Indian agriculture. Loss of fertile topsoil leads to the loss of agricultural productivity which adversely affects the economy of the country. The intensity and frequency of floods and droughts increases in the country. Loss of vegetation can destroy the natural habitat for wildlife.

6. Name any four ways which help in soil conservation.

Ans. Following methods are normally adopted for the prevention of soil erosion and conservation of soil.

Afforestation: The best way to conserve soil is to increase area under the forests. New trees should be planted in the areas of soil erosion and the old ones must be protected. As far as possible the trees should be planted in rows, especially in dry areas to avoid soil erosion. These trees can reduce the speed of winds which can erode the soil cover.

Constructing Dams and Barriers: Most of the rivers during the rainy season cause heavy erosion of the soil. This can be prevented by controlling the flow of rivers by building dams across the rivers.

Check on Shifting Cultivation: Some tribals in India are still practicing the ancient system of shifting cultivation. They should be persuaded by the tribal welfare organizations and the government to switch over to settled agriculture. Actually the shifting agriculture should be banned in India.

Use of Chemical Fertilizers: Most of the soils vary in fertility and in crop producing capability. Continuous cultivation can reduce the fertility and may exhaust some of the essential nutrients. The fertility can be conserved by the application of organic manures and chemical fertilizers.

7. How can change in agricultural practices help in the conservation of soil?

Ans. We can possibly save our valuable soils by adopting certain changes in our agricultural practices. Some of the possible changes are as under:

Contour Ploughing: It involves the ploughing of land along the contours or across the slope of the land. It helps in checking the flow of water. It can reduce the run-off, so that the plants get more water.

Terracing and Contour Bunding: Terracing along the mountain slopes is one of the oldest methods of soil conservation along the hill slopes. The slope of the hill is cut into a series of terraces. There is enough level land on terrace for cultivation. It checks the flow of water, promotes absorption of water by soil and thus reduce erosion.

Crop Rotation: In our country, the farmers tend to grow a particular crop in the same field year after year. This practice can make the soil infertile and takes away certain elements from it. In the crop rotation system, different crops are cultivated on a piece of land each year. This helps in conserving the soil fertility, as different crops need different constituents from the soil.

Strip Cropping: Crops should be grown in alternate strips. They should be parallel to one another. The various crops ripen at different times of the year and are harvested at intervals. Thus, the entire area will not be left exposed at any time. The tall-growing crops in one strip can also act as wind breakers.

Cover Cropping: In the plantations, the gestation period of tree crops is long. The cover crops may be grown between the young trees to protect the soil. The farmers can grow vegetables, which can provide extra income.

Fallowing: Sometimes it is important to allow the land to rest or lie fallow, so that the natural forces can act on the soil. This also increases the subsoil moisture and improves the general structure and texture of the soil.

8. Describe the main features of soil erosion by running water in India.

Ans. The rainfall in India is in the form of heavy downpour. The run-off rainwater can wash away the topsoil.

The erosion of soil due to water is of three types:

1. When the entire top sheet of the soil is carried away, leaving behind barren rocks, it is called **sheet** or **surface erosion**.
2. When the rainwater form the finger-shaped grooves in the soil, it is called **rill erosion**.
3. The enlargement of the rills can form deep gullies, which converts into ravines and badlands. It is called **gully erosion**.

9. What are the main differences between alluvial and red soils in India?

Ans. The main differences in alluvial soil and red soil in India are:

1. The alluvial soils are the most important type of soils in India. The alluvial soils cover about 45 per cent of the total land area of the country. These soils are very fertile and support the bulk of India's population.

   The red soils are the second largest soil group in India and occupies about 11 per cent of the total geographical area of the country.

2. The rivers which originate from the Himalayan mountains bring with them a large amount of sediments. These sediments are deposited in the river valleys and in the flood plains. These sediments are composed of fine particles of sand, silt and clay. These are called **loam** and **alluvium.**

   Most of the red soils have been formed due to the weathering of igneous (ancient crystalline) and metamorphic rocks of the highlands in the peninsular plateau region of India. The red soils differ from place to place depending upon the parent rocks and climatic conditions.

3. The alluvial soils are found in the Northern Plains of India, which extends from Punjab in the west up to West Bengal and Assam in the east. Some alluvial soils are also found in the deltas of Mahanadi, Godavari, Krishna and Kaveri rivers along the eastern coast of Peninsular India. The northern part and coastal areas of Gujarat also has some deposits of alluvial soils.

   The red soils are found in Tamil Nadu, parts of Karnataka, southeast Maharashtra, eastern parts of Telangana and Andhra Pradesh, Madhya Pradesh, Chhattisgarh, Jharkhand and Odisha. In the northeastern India, the red soils are spread over parts of Assam, Nagaland, Manipur, Mizoram, Tripura and Meghalaya. In the west, the red soils are found along the Konkan coast of Maharashtra. These areas mostly encircle the black soil regions.

4. The alluvial soils have adequate potash, phosphoric acid and lime, but are deficient in organic and nitrogenous contents. The red colour of the red soil is due to high percentage of iron oxide. The red soils are rich in potash, but poor in phosphoric acid, nitrogen, lime and humus.
5. The alluvial soils are soft and porous and thus easily tillable whereas the texture of the red soils varies from sandy to clayey and majority of them are loamy.
6. The alluvial soils are best suited for irrigation due to their softness and fertility. The red soils are not very fertile and respond well to the proper use of fertilizers. The red soils also need irrigation support for producing crops.
7. The alluvial soils can produce a variety of kharif and rabi crops, such as rice, wheat, maize, sugar cane, tobacco, cotton, jute, oilseeds and pulses. With proper doses of fertilizers and irrigation, red soils are suitable for growing cotton, wheat, rice, pulses, millets, oilseeds, tobacco, fruits, potatoes and vegetables.

10. Compare the characteristics of Bangar and Khadar.

Ans. The alluvial soils are of two types – old alluvium called bangar and new alluvium called khadar. The main differences in the characteristics of the two types of alluvial soils are:

- Khadar is deposited in the flood plains and deltas, while bangar is found on the higher side of the river valleys.
- Khadar soils are more fertile than the bangar soils, as khadar are easily replenished by the recurrent floods in the rivers.
- Khadar soil is sandy and light in colour, while bangar soil is clayey and dark in colour.
- Khadar soils are finer in texture, while the bangar soils are coarse in texture.

E. On the outline map of India, mark and label the following.

1. Regions having alluvial soils
2. Two states which have laterite soils
3. The Deccan Trap
4. Two states which have red soils

Ans. Map work

Chapter 8

INDIA — NATURAL VEGETATION

A. Distinguish between the following.

1. Endemic plants and Exotic plants

Ans. The natural vegetation, which is purely Indian in origin, is called the endemic plants, while those which have come from outside India are called the exotic plants.

2. Evergreen and Deciduous forests

Ans. The tropical evergreen forests grow mainly in those areas where the average annual rainfall is more than 200 cm and the dry season is very short. These forests are very dense and have tall trees, which can attain a height of about 50 metres. Due to high heat and high humidity the trees in the tropical evergreen forests do not shed their leaves, at least not together.

The tropical deciduous forests grow mainly in those areas where the average annual rainfall is between 70 cm and 200 cm, with a distinct dry season. The trees in the tropical deciduous forests normally shed their leaves for about 6 to 8 weeks during the spring and the early summer seasons.

3. Monsoon and Mangrove forests

Ans. The tropical deciduous forests are known as the monsoon forests. These forests grow where the average annual rainfall is more than 200 cm and the dry season is very short. These forests are very dense and have tall trees. They do shed their leaves together.

The littoral forests, also known as tidal or mangrove forests. Trees in these forests can grow and survive in fresh as well as in saline water. The roots of mangrove trees are exposed during low tide, but are submerged in water during high tide.

4. Agroforestry and Farm forestry

Ans. The agroforestry involves the planting of trees and crops on the same land, so that the farmers get food, fodder, fuel, timber and fruits from their land.

Farm forestry is of two types – commercial and non –commercial. The commercial farm forestry involves the planting of trees, such as poplars, eucalyptus, casuarina, etc. in the field in place of crops. The produce are used in forest-based industries and as fuel-wood. The non-commercial farm forestry involves the planting of trees on the margins of farmlands, wastelands, grasslands, land around homes and cowsheds. The produce are not for sale.

B. Answer the following questions briefly.

1. What is natural vegetation?

Ans. Natural vegetation refers to a plant community which has grown naturally without human aid and has been left undisturbed by humans for a long time.

2. Why is there a great variety of natural vegetation in India?

Ans. A great variety of natural vegetation is found in India due to unequal distribution of temperature and rainfall.

3. What happened to the original vegetation cover in India?

Ans. The original vegetation in India consisted of forests, grasslands and scrubs. Most of it has been destroyed by human beings to meet his various needs.

4. Name the geographic factors which influence the growth of natural vegetation in India.

Ans. The main geographical and environmental factors which influence the growth and development of natural vegetation in India are topography, climate and soil.

5. Why is temperature less important for growth of vegetation in the Himalayas?

Ans. The Himalayan ranges show change in vegetation. In mountain areas with increase in altitude there is a corresponding decrease in temperature which leads to change in vegetation type. The temperature of the atmosphere decreases with increase in height above the sea level. This is the reason the natural vegetation in the mountains is influenced more by temperature than by humidity or rainfall.

6. How much area of the country should be under the forests according to National Forest Policy?

Ans. According to the National Forest Policy of India, the minimum desired area under the forests should be about 33 per cent. Thus, the forest resources in India are extremely inadequate.

7. How much area is under the forests in the northeastern states of India?

Ans. The northeastern states have more than 30 per cent of land under dense forests.

8. How do the forests help in moderating the climate?

Ans. The forests act as the moderator of climate and influence the temperature, humidity and precipitation. Continuous transpiration from plants increases the relative humidity of the air, which increases the possibility of precipitation. The forests absorb carbon dioxide from the atmosphere and thus help in maintaining the temperature of the atmosphere.

9. Name the main types of forest found in India.

Ans. On the basis of relief, climate and soils, the natural vegetation or forests in India can be broadly divided into following five types:

1. The tropical evergreen forests
2. The tropical deciduous forests
3. The tropical thorn forests
4. The littoral forests
5. The mountain forests

10. What is the other name of tropical deciduous forests?

Ans. The tropical deciduous forests are also known as the monsoon forests.

11. Name any five products, which we can get from the forests.

Ans. Forests provide valuable timber for domestic and commercial use and a variety of raw materials for industries. We get rubber, resins, rubber, herbs and medicines, honey, spices, etc. from the forests.

12. Name any four trees associated with tropical evergreen forests.

Ans. The main species of trees found in the tropical evergreen forests are rosewood, ebony, mahogany, cinchona, etc.

13. What are the main types of undergrowth in the tropical evergreen forests?

Ans. Due to dense growth of trees, the sunlight cannot reach the ground. Thus, the ground is mostly marshy and the undergrowth is mainly canes, bamboos, ferns, climbers, etc.

14. Name the important trees in the tropical deciduous forests.

Ans. The most important trees in the moist and dry tropical deciduous forests are teak, sal, tendu, khair, sandalwood, mahua, mulberry, bamboo, pipal, neem, etc.

15. Where do the littoral forests occur mostly?

Ans. The dense littoral forests occur all along the coastline, in the sheltered estuaries, backwaters, salt marshes

and mud flats. These forests also occur in tidal creeks and coastal areas, which are prone to tidal waves. They are mostly found in and around the deltas of Ganga, Mahanadi, Godavari, Krishna and Kaveri rivers.

16. What is the significance of Sundarbans?

Ans. The delta region of Ganga and Brahmaputra rivers is called Sundarbans, which is covered with Sundari trees. These trees provide hard and durable wood, which is used for making boats and construction work.

17. Which forests in South India are called 'Sholas'?

Ans. In the higher areas, especially in Nilgiri hills, Palni hills and Anaimalai hills, the temperate forests are found. These forests are locally called sholas.

18. What is the relationship between vegetation and environment?

Ans. The growth and development of various types of vegetation have an intimate relationship with their immediate environment. The forests not only improve the environment, but also protect it. The forests act as the moderator of climate and influence the temperature, humidity and precipitation which directly influence the environment.

C. Give reasons for each of the following.

1. The forests are unevenly distributed in India.

Ans. A great variety of natural vegetation is found in India due to unequal distribution of temperature and rainfall. The natural vegetation in India varies greatly from one region to another due to variations in climatic conditions and soils. Because of variations in relief, climate and soils, these forests are very unevenly distributed.

2. The wood from tropical evergreen forests is of high economic value.

Ans. The wood from the tropical evergreen and semi-evergreen forests is hard, durable, fine-grained and therefore is of high economic value.

3. The commercial exploitation of tropical evergreen forests is uneconomic.

Ans. Due to dense growth of trees in tropical evergreen forests, a large number of species grow together in a small area. The ground where trees grow is mostly marshy and the undergrowth is mainly canes, bamboos, ferns, climbers, etc. This is the reason the commercial exploitation of these forests is difficult and uneconomic.

4. Forests help in maintaining the underground water table.

Ans. Forests help in controlling soil erosion, land reclamation and flood control.

They help in the percolation of water and thus maintain the underground water table.

5. The bushes or trees in desert areas have long roots.

Ans. The trees are scattered in desert areas and have long roots, which can penetrate deep into the soil to reach the underground water.

6. The trees develop a broad canopy in the tropical evergreen forests.

Ans. Due to high heat and high humidity the trees in the tropical evergreen forests do not shed their leaves, at least not together. The trees are very tall and can attain a height of about 50 metres. Trees in the forests are very closely placed and form a multilayered structure with a broad canopy, which look like a continuous green carpet when viewed from above.

7. The thorn forests are found in the parts of western Rajasthan.

Ans. The tropical thorn forests, also known as the tropical desert vegetation, are found in the arid and semi-arid areas of Rajasthan. The average annual rainfall in these areas is less than 50 cm and there is a distinct long dry season. The average temperature in these areas is between 25 °C and 30 °C and the relative humidity is less than 50 per cent. Because of these climatic conditions the vegetation in such tropical hot

desert is mainly thorny trees and bushes.

8. The monsoon forests are more valuable than other types of forests in India.

Ans. The tropical deciduous forests, also known as the monsoon forests, are most widespread in India. The trees in the deciduous forests are commercially important and provide valuable timber and many other useful products. Trees like teak, sal, tendu, khair, sandalwood, mahua, mulberry, bamboo, pipal, neem, etc are mostly found in these forests which are economically very important. This is the reason the monsoon forests are considered more valuable than other types of forests in India.

9. Some trees shed their leaves during the spring and early summer seasons.

Ans. The trees in the tropical deciduous forests normally shed their leaves for about 6 to 8 weeks during the spring and the early summer seasons. It is because during this period lack of moisture in the subsoil forces the trees to shed the leaves.

10. The tropical deciduous forests need scientific management.

Ans. Tropical deciduous forests have been most exploited and large areas have been cleared to provide more land for agricultural purposes. These forests have also suffered due to over-cutting, overgrazing, fires, etc. So they need scientific management for their conservation.

11. The trees in tropical deserts have thick bark and small leaves.

Ans. The tropical desert vegetation grow mainly in those areas where the average annual rainfall is less than 50 cm and there is a distinct long dry season. The trees in tropical deserts have thick bark and small thick leaves, which reduce evaporation or transpiration and prevent loss of water.

12. The vegetation in Western Ghats is a mixture of tropical and temperate forests.

Ans. The lower parts of Western Ghats, especially in Karnataka, Tamil Nadu and Kerala, mainly tropical and subtropical forests are found whereas in the higher areas, especially in Nilgiri hills, Palni hills and Anaimalai hills, the temperate forests predominate.

All these regions are close to the Tropic of Cancer and the height of these hills are about 1500 m above the mean sea level. The vegetation of these areas are affected by their geographic locations.

13. Many species of plants in India are on the verge of extinction.

Ans. The forests in India are highly mismanaged due to primitive methods of exploitation and lack of scientific planning. The deforestation is occurring due to overgrazing, shifting agriculture, construction and commercial activities. Due to reckless cutting of trees, many species of plants are on the verge of extinction.

14. The forests help in controlling soil erosion.

Ans. Along the hill slopes, the forests help in controlling soil erosion. The roots of trees and undergrowth help in flood control and reclamation of land. The forests help in the seepage of water through the soil, which further helps in maintaining the underground water table and thus control soil erosion.

D. Answer the following questions.

1. Why are forests considered as valuable natural resources?

Ans. Forests are considered as important and valuable natural resources. They offer a number of direct and indirect advantages. Some of them are as under:

- Forests provide valuable timber for domestic and commercial use and a variety of raw materials for industries.
- We get lac, gums, resins, rubber, tanning materials, herbs and medicines, honey, spices, etc. from the forests.
- About four millon people are employed in forests for collecting wood, lumbering, sawing, furniture making, etc.

- Grazing of cattle in the forests helps in cattle rearing and dairy farming.
- Forests provide a variety of products which are exported and earn valuable foreign exchange.
- Many forest reserves provide natural habitat for wildlife and some have been developed as tourist centres.
- Forests can moderate climate and influence temperature, humidity and precipitation.
- Forests absorb atmospheric carbon dioxide and help in controlling the air pollution.
- Forests help in controlling soil erosion, land reclamation and flood control.
- They help in the percolation of water and thus maintain the underground water table.
- Decay and decomposition of leaves from plants provide humus to the soil and thus increase soil fertility.

2. Mention at least three main features of forest wealth in India.

Ans.
- A great variety of natural vegetation is found in India due to unequal distribution of temperature and rainfall.
- With more than 45,000 plant species, India is the tenth largest in the world and fourth largest in Asia in plant diversity.
- The main geographical and environmental factors which influence the growth and development of natural vegetation in India are topography, climate and soil.

3. Answer the following questions with reference to tropical evergreen forests in India.

a. The main characteristics of trees in these forests.

Ans.
- Due to high heat and high humidity the trees in the tropical evergreen forests do not shed their leaves, at least not together.
- These forests are very dense and have tall trees, which can attain a height of about 50 metres.
- The wood from the tropical evergreen and semi-evergreen forests is hard, durable, fine-grained and of high economic value.

b. Name the two types of tropical evergreen forests.

Ans.
- The main species of trees found in the tropical evergreen forests are rosewood, ebony, mahogany, cinchona, chaplas, cane, etc.
- Due to dense growth of trees, the sunlight cannot reach the ground. Thus, the ground is mostly marshy and the undergrowth is mainly canes, bamboos, ferns, climbers, etc.

c. Mention the regions, where these forests are mostly found.

Ans. The tropical evergreen forests are found mostly along the western side of the Western Ghats, in the northeastern states and in Andaman and Nicobar Islands. The semi-evergreen forests are found along the lower slopes of eastern Himalayas, coast of Odisha and western coast of India.

d. What climatic conditions are helpful in growth of forests?

Ans.
- The tropical evergreen forests grow mainly in those areas where the average annual rainfall is more than 200 cm and the dry season is very short.
- The average relative humidity should be more than 75 per cent.
- The average annual temperature should be between 25 to 27 °C.
- The general climatic conditions should be hot and humid.

4. Answer the following questions with reference to littoral forests in India.

a. Name the areas where these forests are mainly found.

Ans.
- The dense littoral forests occur all along the coastline, in the sheltered estuaries, backwaters, salt marshes and mud flats.

- The littoral forests also occur in tidal creeks and coastal areas, which are prone to tidal waves.
- These forests occur in and around the deltas of Ganga, Mahanadi, Godavari, Krishna and Kaveri rivers.

b. What are epiphytes and breathing roots?

Ans. The epiphytes (the plants growing on other plants) are found all over the littoral forests. The roots of mangrove trees are exposed during low tide, but are submerged in water during high tide. The trees can be about 30 metres tall and have special breathing roots, called **pneumatophores**.

c. Give any three features of trees in littoral forests.

Ans.
- The trees in littoral forests can grow and survive in fresh as well as in saline water.
- The littoral forests have mostly evergreen trees, which are associated with wetness.
- The main trunk of the tree is supported by stilt like roots, which mostly remain under water.

d. What is the significance of Sundarbans?

Ans. The delta region of Ganga and Brahmaputra rivers is called **Sundarbans**, which is covered with Sundari trees. This tree provides hard and durable wood, which is used for making boats and construction work.

5. Describe the relationship between the natural vegetation and environment.

Ans. The growth and development of various types of forests have an intimate relationship with their immediate environment. The forests not only improve the environment, but also protect it by performing the following functions:

- The forests act as the moderator of climate and influence the temperature, humidity and precipitation.
- Continuous transpiration from plants increases the relative humidity of the air, which increases the possibility of precipitation.
- The forests absorb carbon dioxide from the atmosphere and thus help in controlling the pollution in air.
- Along the hill slopes, the forests help in controlling soil erosion.
- The roots of trees and undergrowth help in flood control and reclamation of land.
- The forests help in the seepage of water through the soil, which further helps in maintaining the underground water table.
- The decay and decomposition of leaves provide humus to the soil and thus increase the fertility of soils.

6. Explain the vegetation in the Northern mountains regions.

Ans. In the northern mountains, we notice a succession of natural vegetation belts, ranging from tropical to alpine forests.

- Between the height 1000 m and 2000 m, the evergreen broad-leaved trees such as oak and chestnut predominate.
- Between the height 1500 m and 3000 m, the coniferous trees such as pine, deodar, silver fir, spruce, cedar, etc. cover the southern slopes of Himalayas and northeastern states in India.
- At the height of about 3000 m and above, temperate grasslands are found. The main types of vegetation include alpine vegetation.
- At still higher altitudes, the tundra vegetation, such as mosses and lichen predominate.

7. Give at least two differences between the Northern and Southern mountain regions.

Ans. In northern mountain regions the eastern Himalayas are closer to Tropic of Cancer than the western Himalayas whereas all the southern mountain regions are close to the Tropic of Cancer. In the northern mountain regions, we notice a succession of natural vegetation belts, ranging from tropical to alpine

forests whereas in the Western Ghats of southern mountain regions , the vegetation is a mixture of tropical and temperate forests.

8. Answer the following questions with reference to tropical deciduous forests.

a. Name the main types of trees associated with these forests.

Ans. The most important trees in the moist and dry tropical deciduous forests are teak, sal, tendu, khair, sandalwood, mahua, mulberry, bamboo, pipal, neem, etc.

b. Name the two types of tropical deciduous forests.

Ans.

1. The **moist deciduous forests**
2. The **dry deciduous forests**

c. In which states of India, these forests mostly grow.

Ans. The **moist deciduous forests** found mostly along the foothills of Himalayas, northeastern states, Jharkhand, western Odisha, Chhattisgarh and on the eastern slopes of Western Ghats.

The **dry deciduous forests** found in humid parts of peninsular plateaus and the plains of Bihar and Uttar Pradesh.

d. What climatic conditions help the growth of deciduous trees?

Ans. The tropical deciduous forests grow mainly in those areas where the average annual rainfall is between 70 cm and 200 cm, with a distinct dry season. The mean annual temperature should be around 27 °C and the relative humidity should be between 50 to 80 per cent.

e. Give at least three characteristics features of these forests.

Ans.
- The trees in the tropical deciduous forests normally shed their leaves for about 6 to 8 weeks during the spring and the early summer seasons.
- The trees in the deciduous forests are commercially important and provide valuable timber and many other useful products.
- The tropical deciduous forests have open stretches where grasses grow due to enough sunlight on the ground.

9. Why is the conservation of forest necessary?

Ans. The forests have an intimate relationship with the existence of life on Earth. All forms of vegetation including forests must be protected and conserved for the survival and prosperity of human beings.

10. Describe three methods which can help in the conservation of forests.

Ans.
- The afforestation programme must be launched in every part of India with emphasis on fuel-wood, small wood and fodder.
- The green belts having trees and bushes should be developed around the cities, industrial centres, historical and cultural centres, tourists centres, etc.
- The indiscriminate cutting of trees must be stopped legally. If cutting of a tree is essential, then ten or more trees should be planted in place of the cut tree.

11. Answer the following questions with reference to the social forestry.

a. What is the aim of social forestry?

Ans. Social forestry is the management and protection of forests and afforestation of barren and wastelands for the development of social environment. The aim is to reduce pressure on existing forests by developing plantations for fuel-wood, fodder and grasses. Actually the social forestry is described as the **forestry of the people, by the people and for the people.**

b. Which areas are to be used for social forestry?

Ans. Under social forestry different areas of villages, towns and cities are uses for plantation.

The **agroforestry** involves the planting of trees and crops on the same land, so that the farmers get food, fodder, fuel, timber and fruits from his land. The **community forestry** involves the planting of trees on public or community lands for the benefit of community.

The **commercial farm forestry** involves the planting of trees, such as poplars, eucalyptus, casuarina, etc. in the field in place of crops. The produce are used in forest-based industries and as fuel-wood. The **non-commercial farm forestry** involves the planting of trees on the margins of farmlands, wastelands, grasslands, land around homes and cowsheds. The urban forestry involves the planting of trees on public and private lands in the towns and cities. It includes green belts, roadside avenues, zoos, recreational parks, etc.

c. Explain the concept of urban forestry.

Ans. The urban forestry involves the planting of trees on public and private lands in the towns and cities. It includes green belts, roadside avenues, zoos, recreational parks, etc. It helps in reducing pollution, improving aesthetic values and recreation.

d. Why do we need social forestry?

Ans. In order to reduce pressure on existing forests, trees are planted on public and private lands, barren and wastelands, community land, land along canals, roads, railways, etc. of towns, cities and villages by developing plantation for fuel-wood, fodder and grasses. Social forestry also helps in reducing pollution, improving aesthetic values and recreation.

12. Why do the thorn forests remain leafless for a major part of the year?

Ans. The tropical desert vegetation grow mainly in those areas where the average annual rainfall is less than 50 cm and there is a distinct long dry season. The average temperature is between 25 °C and 30 °C and the relative humidity is less than 50 per cent. In such climatic conditions only thorny trees and bushes grow. There are no tall trees. Most of the plants remain leafless for a major part of the year due to the shortage of moisture and low relative humidity.

E. On an outline map of India, mark the different types of forests in India.

Ans. Map work

Chapter 9

INDIA — WATER RESOURCES

A. Distinguish between the following.

1. Surface water and Ground water

Ans. The surface water is available to us in the form of rivers, lakes, ponds, canals, etc. A part of rainwater percolates through rocks and soil, and is available to us as groundwater.

2. Tankas and Khadins

Ans. Rooftop rainwater harvesting was practiced to store drinking water, particularly in Rajasthan. In Bikaner and Barmer regions most of the houses have underground tanks or tankas, for storing rainwater as drinking water. The tankas were built inside the house or in the courtyard. These are connected to the sloping roofs of the houses with a pipe. In arid regions, the agriculture fields are used to store water which can moisten the soil, like 'khadins' in Jaisalmer and 'johads' in other parts of Rajasthan.

3. Well and Tube well

Ans. A well is a hole dug in the ground to reach and lift the subsoil or underground water, which can be used for irrigating the farmland and for other purposes. An ordinary well is about 5 to 10 metres deep. The tube well is a very deep bore, about 50 metres, which has to be dug with the help of drilling machines. The water is taken out with the help of a pump run on electricity.

4. Perennial and Inundation canals

Ans. The Perennial Canals are taken out from the perennial rivers by constructing a barrage or a weir to regulate the flow of water. Most of the canals in our country belong to this group. The Inundation Canals are taken out directly from the rivers, without making any kind of barrage or dam. These canals use the excess water in rivers at the time of floods and are useful only in the rainy reason.

B. Answer the following questions briefly.

1. What are the main uses of fresh water in India?

Ans. We need fresh water for cooking food, drinking, bathing, washing, irrigation, industries and host of other purposes.

2. Why is our Earth called the Blue Planet?

Ans. Earth is the only planet in the solar system, which has water. About 71 per cent of Earth's surface is covered with water. This is the reason, our Earth is also called the watery planet or Blue Planet.

3. Where do we find about 70 per cent of the fresh water on Earth?

Ans. Out of the total water on the Earth, only about 3 per cent is freshwater. About 70 per cent of the total freshwater on Earth occurs as ice sheets and glaciers in Antarctica, Greenland and in the mountainous regions of the world.

4. What are the main sources of fresh water in our country?

Ans. The main sources of freshwater are surface water and groundwater. Rainfall is the most important source of freshwater in India. The surface water is available to us in the form of rivers, lakes, ponds, canals, etc.

5. What led to the idea of interlinking rivers in a national grid?

Ans. During the rainy season, most of the rivers in India are flooded. Thus, a large amount of water flows down to sea and is not available for any use. This led to the idea of interlinking the rivers through a national grid. It thus helped in transferring of rainwater water from one river basin to another.

6. How is the groundwater used in our country?

Ans. India is estimated to have nearly 450 billion cubic metres water as groundwater. Of the total ground water resources available , about 25 per cent is used for domestic, industrial and related purposes, while about 75 per cent is used for irrigating the farmland.

7. Why is there a shortage of water in many parts of India?

Ans. The main sources of freshwater are surface water and groundwater. Rainfall is the most important source of freshwater in India. Most of the rainfall in India comes from the Southwest Monsoons. during June to September. The rainfall in our country is not evenly distributed.

The present day shortage of water is mainly due to over-exploitation, excessive use and wastage, and unequal access to water among different social groups.

8. Give at least four reasons for the conservation of water.

Ans.
- Increasing demand of water due to increase in population and industrial activities
- Increase in the level of water pollution
- Uneven distribution of water among communities
- Variation in the availability of water due to variations in seasonal and annual precipitation.

9. Suggest at least three methods for the conservation of water.

Ans.
- Stop the reckless use of water resources and reduce the wastage of water.
- Make proper arrangements for recycling and reuse of water.
- Reduce the pollution of water and purify the polluted water for use in agriculture and industries.

10. How is drip irrigation helpful in saving precious water?

Ans. Drip irrigation is helpful in saving precious water as it needs much less water and there is no wastage water.

C. Give reasons for each of the following.

1. Most of the rivers coming from Himalayas are perennial rivers.

Ans. Most of the rivers coming from Himalaya ranges are perennial rivers as they carry sufficient amount of water throughout the year.

2. In Deccan Plateau region, it is difficult to use the groundwater resources.

Ans. Most of the peninsular plateau area is composed of hard rocks and is not much favourable for exploiting groundwater resources. It is therefore difficult to use the groundwater resources in Deccan plateau region.

3. The groundwater table is falling continuously at an alarming rate.

Ans. The demand for groundwater is increasing rapidly due to rapid increase in population.

Nearly 40 per cent of water demand in urban India is met by groundwater. Many big cities are not able to provide enough freshwater to the households. There is no technology available which could make optimum use of available water resources. Because of increasing use of groundwater, the groundwater table is falling at an alarming rate.

4. Canals are an effective source of irrigation in India.

Ans. Canals are the second largest sources of irrigation in India. The canals irrigate about one-third of the net irrigated area. India has one of the largest canal system in the world. But canals are proved to be an effective source of irrigation in those areas which have perennial source of water, deep fertile soils, low level relief, and have an extensive command area.

5. The world will be facing a severe shortage of water in the coming future.

Ans. About 71 per cent of Earth's surface is covered with water. Out of the total water on the Earth, only about 3 per cent is freshwater. Even this small amount of freshwater is not available in the same quantity everywhere. About 70 per cent of the total freshwater on Earth occurs as ice sheets and glaciers in Antarctica, Greenland and in the mountainous regions of the world. The present day shortage of water is mainly due to over-exploitation, excessive use and wastage and large scale pollution. In view of the short supply of water and its increasing demand, it is predicted that world will face a severe shortage of water in the coming future.

6. Canal irrigation leads to the ground around it becoming unproductive.

Ans. The excessive flow of water in the fields through irrigation, can raise the level of groundwater. Over a period of time, this causes high concentration of salt in the soil, called reh, which means the ground around it becomes infertile and unproductive.

7. Irrigation is necessary in India despite good monsoons.

Ans. The rainfall in India is not only uncertain, unreliable and irregular, but also variable, seasonal and unevenly distributed. Some crops such as rice, jute and sugar cane, need irrigation facilities even in the areas of heavy rainfall. The rainfall in most parts of India is torrential in nature and thus most of the rainwater goes waste, which has to be compensated by an adequate and efficient system of irrigation. This is the reason irrigation is necessary in India despite having good monsoons.

8. The drip irrigation is the best method among all modern methods of irrigation.

Ans. The drip irrigation is the best method among all modern methods of irrigation as it requires much less water and water is supplied slowly, allowing the soil to absorb the water and avoid runoff. There is little water loss due to evaporation or runoff. This method is also cost effective and operated on very low – pressure systems.

D. Answer the following questions which are based on rainwater harvesting.

1. What is rainwater harvesting?

Ans. Rainwater harvesting is one of most successful methods for the conservation and management of water resources through collection and storage of rainwater, which can be used for different purposes. It is a technique of increasing the recharge of groundwater by storing rainwater locally, through roof water harvesting, refilling of dug wells, recharging of hand pumps, construction of percolation pits, trenches around fields and bunds or dams on small rivulets.

2. Name any two factors on which the success of rainwater harvesting depends.

Ans. The success of rooftop rainwater harvesting depends on the amount of rainfall and the area of the rooftop.

3. Which states in India have made rainwater harvesting compulsory?

Ans. Tamil Nadu is the first and the only state in India which has made rooftop rainwater harvesting structures compulsory to all the houses across the state.

4. Why is rooftop rainwater harvesting declining in western Rajasthan?

Ans. In western Rajasthan, the practice of rooftop rainwater harvesting is on the decline as plenty of water is readily available from the perennial Indira Gandhi Canal.

5. Why is rainwater harvesting needed in our country? Give at least four reasons.

Ans. Rainwater harvesting is a useful method for a developing country like India in reducing the cost of purifying water. Rainwater harvesting is needed due to the following reasons:

- to solve the shortage of surface water.

- to increase the level of groundwater (water table)
- to assure the use of ground water for sustainable development.
- to reduce the run-off which can choke the drains.

6. Name the regions where rainwater harvesting can be developed.

Ans. The potential areas where rainwater harvesting can be developed, are as under:

- where groundwater levels are regularly declining.
- where the acquifers have been de-saturated.
- where availability of groundwater is inadequate during dry months.
- where due to rapid urbanisation, infiltration of rainwater into subsoil has decreased drastically and recharging has reduced.

7. What is the significance of rainwater harvesting?

Ans. Rooftop rainwater harvesting can easily solve the problem of water shortage, especially in urban areas. At the same time it reduces the occurrence of floods and the impact of drought.

It also reduces soil erosion. Rainwater harvesting is a useful method for a developing country like India in reducing the cost of purifying water.

8. Give at least three main advantages of rooftop rainwater harvesting.

Ans. Rooftop rainwater harvesting has the following advantages:

- The cost of recharging groundwater is less than for surface reservoirs.
- No land is wasted when the water is stored underground.
- No displacement of people is involved in roof top harvesting.
- Groundwater is not exposed for evaporation and pollution.

E. Answer the following questions which are based on the methods of irrigation in India.

1. What is irrigation?

Ans. The process of supplying water to crops by artificial means, such as canals, wells, tube wells, tanks, etc. is called irrigation.

2. Name the different means of irrigation in India.

Ans. The main sources of water for irrigation are rivers, tanks or underground water. The different means through which irrigation of fields are done are: wells, tube wells, canals and tanks.

3. Why is irrigation needed in our country?

Ans. In India, about 65 per cent of the total population is directly or indirectly dependent upon agriculture. Water is an important input for growing crops. Water is made available to the agricultural field either by rainfall or by human efforts, i.e. through various means of irrigation.

The rainfall in India is not only uncertain, unreliable and irregular, but also variable, seasonal and unevenly distributed. The rainfall in most parts of India is torrential in nature and thus most of the rainwater goes waste, which has to be compensated by an adequate and efficient system of irrigation.

4. Why should we improve the system of irrigation? Give two reasons.

Ans. In India, the most important source of water for agriculture is rainfall, which is uncertain and unreliable. The main sources of water for irrigation are rivers, tanks or underground water.

In order to increase the agricultural production, we must improve the irrigation system as about 65 per cent of the total population is directly or indirectly dependent upon agriculture.

5. Which geographical factors favour irrigation in India?

Ans. The development of various methods of irrigation in India are influenced by a number of geographical factors.

- The Northern Plains of India have extremely rich fertile soils, which can be easily broken to dig canals and sink wells. The deep clay in the subsoil acts as a reservoir for rainwater, which percolates through porous alluvium. The slope of the land is gentle which helps the canals to carry water even to far off places.
- Most of the rivers, which flow through the Northern Plains of India, have originated from the snow-covered Himalaya mountains. These are perennial rivers, which can easily provide water for irrigating the farms, almost throughout the year. The proper facilities for irrigation helps the farmers to produce more than one crop in a year.
- In the Peninsular Plateau region, the rocks are hard and the slope of land is highly uneven. Thus, it is difficult to dig canal or sink wells in this region. Here the rainwater gets collected in natural depressions to form tanks or ponds. This collected water is used for irrigating the farmland during the dry periods.

6. What is the main feature of rainfall in our country?

Ans. In India, the most important source of water for agriculture is rainfall and the rainfall in India is not only uncertain, unreliable and irregular, but also variable, seasonal and unevenly distributed. The rainfall in most parts of India is torrential in nature and thus most of the rainwater goes waste. Most of the rainfall in India comes from the Southwest Monsoons during June to September. The rainfall in our country is not evenly distributed.

7. What factors favour the development of different methods of irrigation in India?

Ans. The development of different methods of irrigation in India depends on the following factors:

- The relief and slope of land
- The softness and fertility of soils
- The amount and distribution of rainfall
- The availability of surface and ground water
- The type of rivers – perennial and non-perennial.
- The specific needs of various crops

8. What is the ancient history of irrigation in Peninsular India?

Ans. In India, irrigation of farmland was done since ancient times. The Grand Anicut Canal in the Kaveri river basin in Peninsular India was built in the second century C.E.

F. Answer the following questions which are based on the well and tube well irrigation in India.

1. Name and explain the main types of wells in India.

Ans. The wells are generally of the following three types:

- The **unlined well** or the kachcha well can be dug by the farmer near his field. This well is not lined with bricks or stones. The unlined wells are cheaper and easier to dig and maintain.
- The **lined well** or the pucca well is lined with bricks and stones. These wells are dug in those areas where the water table is high. The lined well is more expensive to dig and maintain.
- The **tube well** is a very deep bore, about 50 metres, which has to be dug with the help of drilling machines. The water is taken out with the help of a pump run on electricity

2. How does an ordinary well differ from a tube well?

Ans. An ordinary well is a cheap, dependable and popular source of irrigation in India. Well irrigation is mostly

practised in those areas where sweet groundwater is readily available and the water table is high. A tube well is generally more than 15 metres deep and the water is lifted with the help of a pumping set run on electricity. Most of the farmers in India have both ordinary wells and tube wells for irrigation purposes. The tube wells are mostly used by medium and large farmers.

3. How is the water taken out from a well for irrigation purposes?

Ans. The water from the well can be lifted in many ways. Some of them are as under:

- **The lever method** is an economical and efficient method for lifting water from the shallow wells. This method is popular in Bihar, eastern Uttar Pradesh, Telangana and Andhra Pradesh.
- **The bucket method** is used practically in all villages in India, and people use a rope tied to a bucket to lift water manually from the well. It is also an economical and efficient method of irrigation.
- **The Dekhli method** uses a vertical pole for balancing the bucket with an equal load fixed at the other end.
- **The inclined plane method** or **mhote** is commonly used in Uttar Pradesh. In this method, the bullocks walk up and down a sloping ramp, which can lift a large bucket of water.
- **The Persian wheel method** is mainly used in Punjab, Haryana, Uttar Pradesh and Rajasthan.

4. Which factors favour the installation of a tube well for irrigation in India?

Ans. The following factors favour the installation of tube wells for irrigation.

- There should be enough groundwater, because a tube well can irrigate about 100 hectares of farmland against 5 hectares by an ordinary surface well.
- The level of groundwater should be between 15 metres and 50 metres, otherwise the cost of lifting the groundwater with the help of an electric pump will be very high.
- The power for running the pumps (electricity or diesel) should be available at subsidised rates. This can help the lifting of the groundwater as and when required for irrigating the farmland.
- The soil should be fertile, so that it can give high yield and enough production from the farmland to meet the cost of irrigation by a tube well.

5. Where, in India, well irrigation is widely practiced and why?

Ans. The main areas under well irrigation in India are in the Indo-Gangetic plain; the deltas of Mahanadi, Godavari, Krishna and Kaveri rivers on the eastern coast of India; parts of Narmada and Tapi river basins, and some parts of Deccan Trap. Uttar Pradesh has the largest area under well irrigation, followed by Rajasthan, Madhya Pradesh, Punjab, Haryana, Maharashtra, Gujarat, Bihar and the states along the eastern coast of India. Well irrigation is mostly practised in those areas where sweet groundwater is readily available and the water table is high.

6. What are the main features of well irrigation in India?

Ans. A well is a hole dug in the ground to reach and lift the subsoil or underground water, which can be used for irrigating the farmland and for other purposes. An ordinary well is about 5 to 10 metres deep. The well as a source of irrigating the farmland was known even in ancient India.

The main features of well irrigation are:

- A well, which can be dug at a very low cost, is the simplest and cheapest source of irrigation. The farmers in India can easily afford to have a private well in his field.
- A well or a tube well can be dug at any convenient place, i.e. in the field or near the field. The farmers do not need any planning to have a well or a tube well, as it is necessary for constructing a canal.
- The farmer is not required to pay anything to any agency of the government for irrigating the farmland with the help of a well or a tube well.

- The wells and tube wells are independent sources of irrigation and the farmers can use them as and when required or necessary.
- The useful minerals and chemicals present in the water of wells or tubewells add to the fertility of the soils.
- The bullocks which are used for ploughing the farmland can be used for lifting water from the well and the tractors can lift water from a tube well.

7. What is the importance of tube well irrigation in India?

Ans. Today, tube well is the most popular source of irrigation in India. The first tube well was probably sunk in Uttar Pradesh in 1930. At present, more than 5 million tube wells are operating in different parts of India. Most of the farmers in India have both ordinary wells and tube wells for irrigation purposes. The tube wells are mostly used by medium and large farmers. More than half of the net irrigated area in India is irrigated by wells and tube wells in the states of Uttar Pradesh, Punjab, Haryana, Bihar, Gujarat, Madhya Pradesh, Maharashtra, Tamil Nadu, Andhra Pradesh and Rajasthan. Uttar Pradesh has the largest number of tube wells in the country. The tube well irrigation has contributed substantially for the success of Green Revolution in India.

8. Give three merits and three demerits of well and tube well irrigation in our country.

Ans. Merits of Well and Tube well irrigation:

- A well or a tube well can be dug at any convenient place, i.e. in the field or near the field. The farmers do not need any planning to have a well or a tube well, as it is necessary for constructing a canal.
- The farmer is not required to pay anything to any agency of the government for irrigating the farmland with the help of a well or a tube well.
- The wells and tube wells are independent sources of irrigation and the farmers can use them as and when required or necessary.

Demerits of Well and Tube well irrigation:

- A limited area can be irrigated with help of a well or a tube well.
- The well or a tube well may dry up, if excessive water is taken out for irrigation and other purposes.
- The efficiency of a well or a tube well depends on the availability of groundwater, which varies not only from place to place but also from season to season.

G. Answer the following questions which are based on the canal irrigation in India.

1. Name and explain the two main types of canals in India.

Ans. There are two types of irrigation canals in India. These are:-

- **The Perennial Canals:** These canals are taken out from the perennial rivers by constructing a barrage or a weir to regulate the flow of water. Most of the canals in our country belong to this group.
- **The Inundation Canals:** These canals are taken out directly from the rivers, without making any kind of barrage or dam. These canals use the excess water in rivers at the time of floods and are useful only in the rainy reason.

2. Name the areas, where canals are widely used for irrigation.

Ans. The canals can be an effective source of irrigation in areas having (i) perennial source of water, (ii) deep fertile soils, (iii) low level relief, and (iv) an extensive command area.

3. Name some of the irrigation canal systems in India.

Ans.
- The upper Ganga canal, lower Ganga canal, Sarda canal and Agra canal in Uttar Pradesh;
- The Sirhind canal, Bhakra canal, Bist Doab canal, and Western Yamuna canal in Punjab and Haryana;

- The Sone, Kosi and Gandak canals in Bihar, and
- The Indira Gandhi canal in Rajasthan.

4. What are the main features of canal irrigation in India?

Ans. India has one of the largest canal system in the world. Most of the canals in India provide perennial irrigation. The canals, which are parts of multi-purpose river valley projects are very cheap source of irrigation. The sediments brought by the canal water are deposited in the fields, and thus, add to the fertility of soils. Most of the canals in India are taken out from the perennial rivers by constructing a barrage or a weir to regulate the flow of water.

5. Why is canal irrigation most popular in Northern Plains of India?

Ans. Canal irrigation is widely practised in the Northern Plains of India, where Punjab, Haryana, Uttar Pradesh, Bihar and Rajasthan account for about half of the total canal irrigated area in India. It is because Northern Plains have many rivers which have water throughout the year, and the states in this area have deep fertile soils. Here the digging of canals is not difficult and expensive.

6. What are the merits and demerits of canal irrigation?

Ans. **Merits of canal irrigation:**

- Most of the canals in India provide perennial irrigation and save the crops from drought conditions.
- The canals, which are parts of multi-purpose river valley projects are very cheap source of irrigation.
- The sediments brought by the canal water are deposited in the fields, and thus, add to the fertility of soils.
- In the areas of little rainfall, such as in Rajasthan, the canal irrigation has helped in farming and yielded good production.
- Although the initial expenditure for digging a canal is very high, but it is quite cheap in the long run.
- The summer season is dry in Tamil Nadu and the crops are raised with the help of canal irrigation.

Demerits of canal irrigation:

- Waterlogging is generally experienced along the canal routes. This is due to seepage of water from the canals.
- The excessive flow of water in the fields through irrigation, can raise the level of groundwater. Over a period of time, this causes high concentration of salt in the soil, called **reh**.
- During the rainy season, the canals can overflow their banks and water can cause floods in the surrounding areas.
- The marshy areas near the canals are breeding grounds for mosquitoes. This can spread several diseases.
- Canal irrigation can be practised only in level areas will soft ground.

7. What factors have helped in the development and growth of canal irrigation in India?

Ans. Canals are the second largest sources of irrigation in India. The canals irrigate about one-third of the net irrigated area. India has one of the largest canal system in the world. Canal irrigation is widely practised in the Northern Plains of India, where Punjab, Haryana, Uttar Pradesh, Bihar and Rajasthan account for about half of the total canal irrigated area in India.

Canals can be an effective source of irrigation in areas having (i) perennial source of water, (ii) deep fertile soils, (iii) low level relief, and (iv) an extensive command area. These areas fulfil all these criteria. On the other hand in the Peninsular India, the digging of canals in the hard and rocky areas is not only difficult, but also uneconomic. Thus, in Peninsular India, the canals are practically absent.

8. Name any three states where perennial canals are widely used.

Ans. Most of the canals in our country belong to perennial canals. In most of the states in northern plains such as Punjab, Haryana and Uttar Pradesh perennial canals are widely used.

H. Answer the following questions which are based on the tank irrigation in India.

1. Why is tank irrigation more popular in South India?

Ans. The popularity of tank irrigation in South India is due to the following reasons:

- The undulating relief and hard rocks makes it difficult to dig canals and wells in the peninsular plateau region.
- The percolation of rainwater is very limited due to hard rock structure. Thus, the groundwater is not available in large quantity.
- The rivers are seasonal in nature and most of them dry up in the summer season. Thus, enough water is not available for irrigation.
- Most of the seasonal streams become torrential during the rainy season. The best way is to collect water behind the dams or in the tanks to save water from going to sea.
- Due to the scattered nature of villages in the peninsular plateau region, the farmers favour tank irrigation.

2. Name the traditional areas where tank irrigation is practiced.

Ans. Tank irrigation is very popular in the peninsular plateau region. The traditional areas are in Andhra Pradesh, Telangana and Tamil Nadu. These states account for about 40 per cent of the total area under tank irrigation in India. The Godavari river basin has the largest number of tanks.

3. What are the main features of tank irrigation in India?

Ans. The tanks are built partly as dugouts and partly by enclosing bunds. The water collected in the tanks is used for irrigation and for other purposes. Most of the tanks are of small size and are built by individual farmers or group of farmers.

4. What are the merits and demerits of tank irrigation in India?

Ans. **Merits of tank irrigation:**

- Most of the tanks in the peninsular plateau region are formed due to natural depressions in the surface and thus, do not involve high cost of construction.
- The hard and non-porous bed rock structure does not allow the loss of water through seepage and thus, have longer lifespan.
- Tanks are useful in collecting surplus rainwater, which will otherwise flow into the sea.
- Fishing in the tanks is an additional activity, which provides not only food for the farmer's family, but also extra income to the farmer.

Demerits of tank irrigation:

- During the dry season, most of the tanks dry up and fail to supply water for irrigation.
- Over a period of time, the tanks get silted up and thus require regular desilting.
- Due to large surface area of shallow tanks, much water from the tanks is evaporated and thus lost.
- We know that the rainfall during the monsoon season is irregular, uncertain and unreliable. As and when the monsoon fails, the tanks dry up and are not dependable at that time.
- Most of the tanks have been developed over a large fertile area, which otherwise should have been used for growing crops.

- Sometimes the lifting of water from the tanks for irrigation and bringing it to the farms is not only costly but also difficult.

5. Name the areas where tank irrigation is widely practiced?

Ans. Tank irrigation is very popular in the peninsular plateau region. The traditional areas are in Andhra Pradesh, Telangana and Tamil Nadu. These states account for about 40 per cent of the total area under tank irrigation in India. The Godavari river basin has the largest number of tanks.

Tank irrigation is also practised in Karnataka plateau, eastern Madhya Pradesh, Chattisgarh, eastern Maharashtra, interior of Odisha and Kerala. Outside the peninsular plateau region, Gujarat, Rajasthan, Bundelkhand (Uttar Pradesh), Bihar and West Bengal also have tank irrigation.

6. Why is the area under tank irrigation going down in India?

Ans. The area under tank irrigation has now gone down due to increase in well and tube well irrigation. Now it is only 3 per cent of the total irrigated area in the country.

7. Why are some state governments popularising tank irrigation?

Ans. Some state governments are providing loans for the construction of new tanks and repair of the old tanks. This will help in popularizing tank irrigation, aquaculture, water sports, fishing and supply of water for domestic needs. It is because in the peninsular plateau region, tanks are still an effective way of collecting the rainwater.

8. Which river basin in India has the largest number of tanks?

Ans. The Godavari river basin has the largest number of tanks.

I. On an outline map of India, mark and label the following:

1. Ganga, Indus, Chambal, Brahmaputra, Godavari, Krishna, Kaveri, Narmada, Kosi.
2. The leading state under each of well, tube well, canal and tank irrigation in India.

Ans. **Map work**

Chapter 10

INDIA — MINERAL RESOURCES

(Iron ore, Manganese, Copper and Bauxite)

A. Answer the following questions briefly.

1. Explain with example the difference between mineral and ore.

Ans. A mineral is a natural substance of inorganic or organic origin. It has definite physical and chemical properties. A rock, which has a large concentration of a particular mineral, is called the ore of that mineral.

2. What are the main characteristics of minerals?

Ans. Most of the minerals have the following characteristics:

- The minerals are exhaustible.
- The minerals are unevenly distributed on Earth.
- Most of the minerals have impurities.
- No country is self-sufficient in all the minerals

3. How are the minerals associated with economic growth of human beings?

Ans. The mineral resources have played an important role in the history of human civilization and economic development. The mineral resources have been exploited by the human beings since prehistoric times. Various stages of human and economic development in the world have been named after minerals, such as the Stone age, the Copper age, the Bronze age, the Iron age, etc.

4. What are the various types of minerals?

Ans. On the basis of physical and chemical properties, the minerals are normally divided into:

1. **The metallic minerals** that contain metals, such as iron, copper, gold, silver, manganese, etc.
2. **The non-metallic minerals** do not contain metals, such as limestone, mica, sulphur and coal.

5. Give two examples each of ferrous and non-ferrous minerals.

Ans. **The ferrous minerals,** which have iron content, such as iron and manganese

The non-ferrous minerals, which do not have iron content, such as gold and copper.

6. What are mineral fuels?

Ans. Some non-metallic minerals are called mineral fuels, such as coal and petroleum.

7. Name the well-defined mineral belts of India.

Ans. India has five well-defined mineral belts. These are:

- **The Northeastern Plateau region**, which covers Chotanagpur (Jharkhand), Odisha plateau, West Bengal and parts of Chhattisgarh. This is the largest mineral belt in India.
- **The Central belt** covers parts of Chhattisgarh, Madhya Pradesh, Telangana, Andhra Pradesh and Maharashtra. This is the second largest mineral belt in India.
- **The Southern belt** covers parts of Karnataka and also extends into the Tamil Nadu uplands.
- **The Southwestern belt** covers western Karnataka and Goa.
- **The Northwestern belt** covers Rajasthan and the adjoining areas of Gujarat.

8. Which parts of India are poor in mineral resources?

Ans. The Northern Plains of India have a thick layer of alluvium deposited by the rivers. This region is very poor in mineral resources.

B. Answer the following questions which are based on iron ore resources in India.

1. Why is iron called the backbone of modern civilization?

Ans. Iron, a metal of universal use, is the backbone of modern civilization. It is used for manufacturing articles ranging from safety pins to ships. Iron is a cheap and durable metal. It can be easily mixed with other metals to form useful alloys.

2. Name the main types of iron ore and the percentage of iron present in them.

Ans. Different types of iron ore have varying percentage of pure iron. On this basis, the reserves of iron ore in India can be divided into four types:

- **Haematite** also known as red ochre due to its reddish colour, is the best quality of iron ore in India. The iron contents are about 70 per cent.
- **Magnetite** also known as black ore due to its blackish colour, is the second best quality of iron ore in India. The iron contents are about 60 to 70 per cent.
- **Limonite** is yellow or light brown in colour and is also called the **hydrated iron oxide**. This is the inferior quality and the iron contents ranges from 40 to 60 per cent.
- **Siderite** is of very poor quality, and the iron contents are less than 40 per cent.

3. Which types of iron ore are used in the industry?

Ans. Haematite and magnetite iron ores are used in the industry.

4. Which five states in India produce about 95 per cent of iron ore?

Ans. At present more than 95 per cent of the total iron ore production comes from Odisha, Goa, Chhattisgarh, Jharkhand and Karnataka.

5 Name at least two iron producing centres in the five states.

Ans. Two iron producing centres in five states are:

1. Odisha: Sundargarh, Mayurbhanj
2. Goa: North Goa
3. Chhattisgarh: Bailadila (Bastar), Durg
4. Jharkhand: Singhbhum, Palamau
5. Karnataka: Baba Budan hills, Ballari

6. Name three countries which are importing iron ore from India.

Ans. Iron ore is imported from India by Japan, China, and Koreas.

7. Which steel plants use most of the iron ore from Jharkhand?

Ans. The high grade iron ore from Jharkhand is mostly supplied to IISCO, Bokaro and Rourkela steel plants.

8. The total exports of iron ore from India is declining. Give reasons.

Ans. India is the fourth largest producer of iron ore in the world. Iron ore is mainly exported to Japan, China, Koreas and many European countries. The exports have declined from about 50 million tonnes in 2011-12 to less than 20 million tonnes in 2014-15. It is because more than 80 per cent of the total iron ore produced in India, is sent to iron and steel plants for purification.

C. Answer the following questions which are based on the manganese resources in India.

1. What are the main uses of manganese?

Ans. Manganese is widely used in the making of iron and steel. About 6 kg of manganese is needed in the manufacture of one tonne of steel.

2. Name the states in India, which have more than 90 per cent of the total reserves of manganese ore.

Ans. More than 90 per cent of the total reserves of manganese are in Odisha, Karnataka, Madhya Pradesh, Maharashtra and Andhra Pradesh.

3. Which place in Madhya Pradesh has the largest reserves of manganese ore?

Ans. Balaghat and Chhindwara districts of Madhya Pradesh have the largest reserves of manganese.

4. Name the states in India, which are the leading producers of manganese ore.

Ans. The leading manganese producing states in India are Maharashtra, Madhya Pradesh, Odisha, Andhra Pradesh and Karnataka

5. Why is the export of manganese declining from India?

Ans. There has been a constant decrease in the export of manganese due to fast increasing demand in the local market.

6. Name the industries which use manganese as an important raw material.

Ans. Manganese is an important ingredient in the making of iron and steel, ferro-manganese alloys, chemicals, dry batteries, leather, matches and cotton textile industry. It is also used as a colouring material for glass, pottery and for making coloured bricks.

7. Which countries in the world produce more manganese than India? Name at least three such countries.

Ans. India is the fifth largest producer of manganese in the world, next only to Brazil, Gabon, South Africa and Australia.

8. Name at least three countries, which import manganese from India?

Ans. India now exports only 15 per cent of its total production and most of it goes to Japan, USA, UK, Germany, France and many other European countries.

D. Answer the following questions which are based on the copper resources in India.

1. The mining of copper is a costly affair. Give reasons.

Ans. Mining of copper is a costly affair due to very small percentage of metal in the ore, generally less than one per cent in India.

2. Name the states in India, which have more than 90 per cent of the total reserves of copper.

Ans. More than 90 per cent of the copper reserves are in Rajasthan, Madhya Pradesh and Jharkhand.

3. Which are the leading copper producing states in India?

Ans. Madhya Pradesh, Rajasthan and Jharkhand are the leading copper producing states in India.

4. Why has Jharkhand lost its status as the leading producer of copper in India?

Ans. Jharkhand was the leading producer of copper in India till 1980, but now it is the third largest producer in India. This is partly due to fall in its own production and partly due to increased production from Madhya Pradesh and Rajasthan.

5. Name the main copper producing belt in Rajasthan.

Ans. The main copper producing belt in Rajasthan is the Khetri belt in Jhunjhunu.

6. What are the main uses of copper in India?

Ans. The copper metal is highly ductile and is a good conductor of heat and electricity. It is widely used in the making of electric cables and in various types of electrical equipment. Copper is widely used in defence equipment and automobiles. Copper can easily mix with other metals to make useful alloys.

7. Name the metals, which are mixed with copper to produce brass, bronze and duralumin alloys.

Ans. Copper can easily mix with other metals to make useful alloys, such as brass (with zinc), bronze (with tin), and duralumin (with aluminium).

8. Name the states in which Betul, Khetri, Hazaribagh (copper producing centres) are located.

Ans. Betul : Madhya Pradesh

Khetri: Rajasthan

Hazaribagh : Jharkhand

E. Answer the following questions, which are based on the bauxite resources in India.

1. Why is aluminium a useful metal in the present age?

Ans. Due to its lightness, malleability, ductility and resistance to atmospheric corrosion, aluminium has become one of the most useful metals in the present age.

2. What is the status of India as a bauxite producer in the world?

Ans. The Indian reserves of bauxite are fifth largest in the world, after Guinea, Australia, Brazil and Vietnam.

3. Name two states, which have the maximum reserves of bauxite in India.

Ans. About 70 per cent of the India's bauxite reserves are in Odisha (52 per cent) and Andhra Pradesh (18 per cent).

4. Name the main bauxite producing states in India.

Ans. The main bauxite producing states are Odisha, Chhattisgarh, Maharashtra, Jharkhand, Gujarat and Madhya Pradesh.

5. Name at least one important bauxite producing centre in each of the state – Odisha, Chhattisgarh and Jharkhand.

Ans.
- Odisha: Kalahandi
- Chhattisgarh: Amarkantak plateau
- Jharkhand: Lohardaga

6. What are the main uses of aluminium in our country?

Ans. Aluminium is widely used in making utensils, and it has many applications in electricity, metallurgy, aeronautics, etc. Aluminium is also used in the preparation of chemicals, abrasives, aluminous cement, etc. It is widely used for making alloys with nickel, copper, zinc, magnesium, etc.

7. Where has aluminium replaced copper in industry?

Ans. Aluminium has replaced copper in long distance electric transmission.

8. Bauxite is the oxide of which metal?

Ans. Bauxite is an oxide of aluminium.

F. On an outline map of India, mark and label the following.

Two main producing centres of iron, manganese, copper and bauxite minerals in India.

Ans. **Map work**

Chapter 11

INDIA — ENERGY RESOURCES (CONVENTIONAL)

A. Give reasons for each of the following.

1. Coal was the basis of Industrial Revolution in Europe.

Ans. In the 18th century, coal was used to produce steam, thus became the basis of Industrial Revolution in Europe.

2. The anthracite type of coal is used for domestic purposes.

Ans. Anthracite is the hardest and the best quality of coal with more than 80 per cent of carbon. It has the highest heating capacity. It burns for a long time and leaves little or no ash. That's why anthracite type of coal is used for domestic purposes.

3. The location of coalfields is an important factor in industrial development.

Ans. Coal is a mineral fuel. It has been the main source of energy. In the 18th century, coal was used to produce steam. Therefore the location of coalfields became the basis of Industrial Revolution in Europe.

4. The petroleum is also called the mineral oil.

Ans. The word petroleum has been derived from Latin words, **Petro** (meaning rock) and oleum (meaning oil). Thus, petroleum is the oil obtained from rocks. Petroleum is found in the underground reservoirs associated with sedimentary rocks. It is therefore called the mineral oil.

5. The oil refineries are located either close to oilfields or near the seaports.

Ans. The oil refineries are located close to oilfields as the crude petroleum is refined in oil refineries. They are also located near the sea coast as it facilitates the import of crude oil and disposal of waste into the sea.

6. The future of India depends on our ability to produce and use hydroelectricity.

Ans. Electricity plays an important role in the progress and prosperity of any country. Availability of enough electricity means unrestricted growth of industries, transport and agriculture, which means freedom from hunger and poverty. The future of India depends on our ability to produce and use hydroelectricity as the other two sources of energy, coal and petroleum, are exhaustible and will not be available to us for ever.

B. Answer the following questions, which are based on the coal as a source of energy.

1. What are the conventional sources of energy in India?

Ans. The conventional sources of energy in India are coal, petroleum, natural gas and electricity.

2. Distinguish between the Gondwana and Tertiary coalfields.

Ans. The Gondwana Coalfields are about 250 million years old. The coal in these oilfields is free from moisture. Most of the metallurgical coal is found in these coalfields. The Tertiary Coalfields are about 50 million years old. The coal in the tertiary coal fields has low carbon content and high percentage of sulphur and moisture. The Gondwana coal has a high ash content, while the Tertiary coal has high sulphur content

3. Name the various types of coal and which one is the best quality?

Ans. Depending upon the percentage of carbon contents, there are four types of coal, such as peat, lignite, bituminous and anthracite. Anthracite is the hardest and the best quality of coal with more than 80 per cent of carbon. It has the highest heating capacity. It burns for a long time and leaves little or no ash.

4. Give two main features of Teritary coal in India.

Ans. Tertiary coal has high coking quality with low ash contents. The high sulphur content makes it unsuitable for metallurgical uses.

5. Name four important coal producing states in India.

Ans. Chhattisgarh, Jharkhand, Odisha and Madhya Pradesh are the four important coal producing states of India.

6. Name two coal producing centres in each of the above states.

Ans. Coal producing centres are:

- Chhattisgarh: Korba, Surguja
- Jharkhand: Jharia, Bokaro
- Odisha: Talcher, Sambalpur
- Madhya Pradesh: Singrauli, Shahdol

7. What is lignite and name two states where lignite is found in India?

Ans. Lignite is soft, but more compact than peat. The carbon contents vary from 40 to 60 per cent. Lignite has large percentage of moisture. Its value has increased due to its use in thermal power plants. The lignite coalfields are located mostly in Tamil Nadu and Gujarat.

8. Name the oldest and the largest coalfield in India.

Ans. The oldest coalfield in India is Raniganj, West Bengal. The largest coalfield is Jharia, in Jharkhand.

9. Name any two raw materials derived from coal.

Ans. Coal tar and coke are two raw materials derived from coal.

10. Which type of coal is good for industrial purposes?

Ans. Bituminous coal is widely used for industrial purposes. Bituminous coal is used in the making of coke, which is used in iron and steel industry.

11. What is the significance of lignite coal in Tamil Nadu?

Ans. The estimated reserves of **lignite** coal is about 40 billion tonnes in India. More than 90 per cent reserves of lignite coal are in Tamil Nadu. The famous **Neyveli lignite mines** are in Tamil Nadu. Most of the lignite coal is used for the generation of thermal electricity. Some production is also used in the chemical and fertilizer industry.

12. What is the problem with uneven distribution of coal in India.

Ans. The distribution of coal in India is highly uneven. Most of the coal deposits occur in the northeastern part of the Indian peninsula. Four states, Jharkhand, Odisha, Chhattisgarh and West Bengal, have more than 80 per cent of total reserves in India. Other parts of the country, either have no coal deposits or limited reserves of poor quality coal.

13. Name some problems associated with coal mining in India.

Ans. The coal mining techniques in India are old and outdated. Most of the work in mining coal is done through manual labour. This leads to high production cost in India. The coal dust in the mines create environmental pollution, adversely affecting the miners and their families. The burning of coal in factories and thermal power plants releases many toxic gases in the atmosphere. The safety measures are expensive. There are heavy losses due to pilferage and fire in the coal mines. This leads to a hike in the coal prices.

14. What steps should be taken for the conservation of coal in India?

Ans. The following measures are suggested for it.

- Use of coking coal should be restricted to the metallurgical industry only.
- Selective mining for good quality coal should be effectively stopped.
- Low grade coal should be washed and its impurities removed by using latest technology.

- Production from outlying areas should be set-up to meet the local needs.
    - Small and uneconomic coal mines should be amalgamated to make them economically viable.
    - New coal mining areas should be explored.
    - The use of non-conventional sources of energy should be made more popular.
    - Environmental safety laws should be enforced strictly to prevent pollution in coal mining areas.
    - Thermal power plants should be located near the pit-heads.

C. Answer the following questions, which are based on the petroleum and natural gas as sources of energy.

1. Which parts of India can possibly have deposits of petroleum?

Ans. Some of the regions, where there is a greater possibility for the occurrence of petroleum and natural gas are as under:

- Gulf of Mannar, off the Tirunelvelli coast
- Offshore area between Pt. Calimere and Karaikudi coast
- Offshore area in Bay of Bengal between 12°–16° N and 84°–86° E.
- The marine delta regions of Mahanadi, Godavari, Krishna and Kaveri rivers
- Offshore area between South Bengal and Baleshwar coast
- The arid-tract of Rajasthan
- A long belt from Kashmir, Punjab and Haryana to western Uttar Pradesh
- The offshore area west of Andaman islands

2. Name the various products which can be obtained from mineral oil.

Ans. The crude petroleum yields various products, such as petrol, diesel, kerosene, oil, bitumen, lubricants, aviation fuel, wax, etc.

3. When and where was petroleum first discovered in India?

Ans. In India, petroleum was first discovered in 1860, when Assam Railway was laying the railway track. Petroleum was struck at **Makum** in 1867.

4. Name the main crude producing areas in India.

Ans. The main petroleum producing areas in India are:

- the Brahmaputra valley,
- the Gujarat coast in Western India,
- Barmer district in Rajasthan,
- Offshore region.

5. How is petroleum formed and give its two main uses?

Ans. Petroleum is formed by the gradual decay and compression of various marine deposits. They remain buried for millions of years and the decomposition of the organic matter has led to the formation of mineral oil. Petroleum is a compact and convenient fuel, which has revolutionised land, air and water transportation. Petroleum is used in industry, household and agriculture sectors.

6. Name the main basins in India, which have proved reserves of mineral oil.

Ans. Out of 27 basins in India, 9 have reserves of mineral oil. These are:

- Upper Assam basin
- West Bengal basin

- Western Himalaya basin
- Rajasthan-Saurashtra-Kachchh basin
- Northern Gujarat basin
- Ganga valley basin
- Eastern coastal plain basin
- Andaman and Nicobar islands basin
- Offshore Cambay, Mumbai High and Bassein area

7. Which region in India is the leading producer of petroleum?

Ans. The Mumbai High oilfields are located about 176 km northwest of Mumbai. Today it is the largest oil producing region in India.

8. Name any two coastal and two inland refineries in India.

Ans. Coastal refineries: 1. Trombay (HPCL) - (Maharashtra)
2. Vishakhapatnam (HPCL) - Andhra Pradesh

Inland refineries: 1. Digboi (IOC) - Assam
2. Barauni (IOC) - Bihar

9. Name at least two regions where natural gas has been found.

Ans. Kaveri basin and Godavari– Krishna offshore basin

10. Name any two offshore oilfields in India?

Ans. 1. The West Coast Offshore oilfields: The Mumbai High, the Bassein Oilfields and the Aliabet Oilfields
2. The Eastern Coast Offshore Oilfields: The basin and delta regions of Godavari, Krishna and Kaveri rivers.

11. Describe the importance of offshore oilfields in India.

Ans. Before 1976, the entire petroleum production was from the onshore fields. Due to extensive surveys in the off-shore areas of Kachchh, Khambat, Konkan, Malabar Coast, Coromandel Coast, Sundarbans and Krishna-Godavari delta, several fields have been discovered for commercial production of petroleum.

The West Coast Offshore oilfields include oilfields at Mumbai High, Bassein and Aliabet. The Mumbai High oilfields is the largest oil producing region in India. In the Bassein Oilfields, the reserves, are estimated to be more than those of Mumbai High. The Aliabet Oilfields have been recently discovered in the Gulf of Khambat, about 45 km from Bhavnagar. The commercial production of petroleum is expected to start soon.

In the Eastern Coast Offshore Oilfields Petroleum and natural gas have been discovered in the basin and delta regions of Godavari, Krishna and Kaveri rivers. These oilfields are likely to contribute about 3 to 4 million tonnes of crude oil every year.

12. Name at least three oil producing centres in Gujarat.

Ans. Kachchh, Vadodara and Bharuch districts are three oil producing centres in Gujarat.

13. Which is the oldest oil refinery in India?

Ans. The first oil refinery was set-up at Digboi (Assam) in 1901, with a capacity 2 lakh tonnes per year.

14. What is the future of petroleum industry in India?

Ans. India is not self-sufficient in respect of crude oil and has to import huge quantities from abroad. At present, India has to import about 55 per cent of its needs of petroleum and its products. Efforts are being made by the Oil and Natural Gas Commission and many other private agencies, to conduct extensive surveys in the belt of sedimentary rocks. Due to extensive surveys in the off-shore areas of Kachchh, Khambat, Konkan, Malabar Coast, Coromandel Coast, Sundarbans and Krishna- Godavari delta, several

fields have been discovered for commercial production of petroleum. Some of the regions have been explored where there is a greater possibility for the occurrence of petroleum and natural gas. The ONGC has discovered oilfields at **Mumbai High, Bassein** and **Aliabet**. Petroleum and natural gas have been discovered in the basin and delta regions of Godavari, Krishna and Kaveri rivers. These oilfields are likely to contribute about 3 to 4 million tonnes of crude oil every year.

The crude petroleum is refined in oil refineries that yields various products, such as petrol, diesel, kerosene, oil, bitumen, lubricants, aviation fuel, wax, etc. Today, there are more than 20 oil refineries in India. Reliance Industries has built the world's largest refinery at Jamnagar (Gujarat), which was commissioned in 1999. Today India is fast becoming an important producer, consumer and importer of petroleum products

D. Answer the following questions which are based on the hydroelectricity as a source of energy.

1. What is hydroelectricity and how is it an important source of energy in India?

Ans. Hydroelectricity is a renewable, cheap, clean and environment-friendly source of energy.

The future of India depends on our ability to produce and use hydroelectricity. Due to huge water resources, India can produce large amount of hydroelectricity. The total known potential is about 148000 MW, out of which only 39000 MW has been developed.At present hydro-electricity accounts for about 16 per cent of the total installed capacity.

2. What are purposes served by a dam across the river?

Ans. A dam built across a river often serves more than one purpose at a time, such as flood control, irrigation, power generation, navigation, fishing and tourism.

3. Bhakra and Nangal project is a joint venture of which states in India?

Ans. It is the largest project in India and is named after two dams built at Bhakra and Nangal on the Satluj river. It is a joint venture of Punjab, Haryana and Rajasthan states

4. Name various components of the Bhakra Nangal Project.

Ans. The components of Bhakra Nangal Project are:

- two dams at Bhakra and Nangal,
- Nangal Hydel Channel,
- Power houses,
- Electric transmission lines, and
- Bhakra canal system for irrigation.

5. Across which river Bhakra dam has been built?

Ans. Bhakra dam is built across a gorge on Satluj river near Rupnagar.

6. What is the name of reservoir at the back of Bhakra dam?

Ans. Bhakra dam has developed a huge reservoir at its back, called Gobind Sagar.

7. What is the main feature of Nangal Hydel Channel?

Ans. Nangal Hydel Channel is cemented throughout its length to protect water from seepage. It turns the turbines of powerhouses located below the Nangal dam.

8. Name the places where the two powerhouses have been set-up under the Bhakra Nangal Project.

Ans. The two powerhouses have been built at Ganguwal and Kotla. They have 2 units of 24 MW each and one unit of 29 MW.

9. What is the main problem of Bhakra Nangal Project?

Ans. Bhakra and Nangal project suffers from the problem of **silting**. Water coming from the higher reaches

bring sediments and deposit the silt at the bed of the reservoir, thereby reducing its capacity to store water.

10. Name the river across which Hirakud dam had been constructed.

Ans. Hirakud dam has been built across Mahanadi river at Hirakud.

11. What is the main purpose of the Hirakud Dam Project?

Ans. The reservoir at the back of the dam has a capacity of about 8000 million cubic metres over an area of 630 sq km. The area served by the Hirakud project is very rich in minerals, like iron ore, bauxite, manganese, graphite, chromite, mica and many others. They need large supply of hydroelectricity for their exploration. The power is supplied to a large number of industries and urban centres.

12. Name the other two dams built across the Mahanadi river.

Ans. Two more dams were constructed on Mahanadi, at **Tikrapara** and **Naraj**.

E. On the outline maps of India, mark and label the following.

1. Coal centres – Neyveli, Korba, Jharia, Raniganj, Bokaro, Talcher, Singrauli, Godavari valley
2. Petroleum centres – Digboi, Barmer, Mumbai High, Koyali, Bassein, Ankleshwar
3. Oil refineries – Panipat, Trombay, Barauni, Mangaluru, Jamnagar, Haldia, Chennai, Kochi
4. Dams – Bhakra, Nangal, Hirakud

Ans. Map Work

Chapter 12

INDIA — ENERGY RESOURCES (NON-CONVENTIONAL)

A. Explain the following terms.

1. **Photovoltaic cell:** The solar photovoltaic cell, which is made of semi-conducting material like silicon, can directly convert solar energy into electricity. It is widely used for community lighting, pumping water, irrigation, railway signals, rural telephone system and other purposes.
2. **Wind farm:** A number of windmills are installed over a given area, which is called the wind farm. A windmill is a device which can change the wind energy into mechanical energy. Once the power generation starts, the wind farm can provide power for about 20 years absolutely free of cost as there is no recurring cost on fuel.
3. **Hot spot:** The places, under the Earth's surface, where hot magma is not very deep is called hot spot. The scientists are making efforts to use the geothermal energy of hot spots to generate electricity.
4. **Solar panel:** A set of solar cells with rechargeable batteries is called a solar panel or solar electric power generator. It is widely used for community lighting, pumping water, irrigation, railway signals, rural telephone system and other purposes.
5. **Tide:** The level of sea water rises and falls twice in 24 hours. These are called tides. Efforts have been made to utilise the energy associated with rise and fall of sea level for power generation.
6. **Radioactivity:** Some heavy elements like uranium and thorium, emit radioactive rays, such as alpha, beta and gamma rays. This phenomenon is called radioactivity. The radioactive elements are used as nuclear fuels in nuclear reactors
7. **Windmill:** A windmill is a device which can change the wind energy into mechanical energy.

   Wind energy can be used to run wind-turbines that generate electricity. In the past, the windmills were used to grind grains into flour and drive water pumps to draw water
8. **Geothermal energy:** The interior of the Earth maintains a very high temperature. The heat inside the Earth is called geothermal energy, which has a great potential for the production of non-conventional energy. At some places on the Earth, the hot magma is very close to the surface of the Earth. The places, under the Earth's surface, where hot magma is not very deep is called hot spot. The scientists are making efforts to use the geothermal energy of **hot spots** to generate electricity.
9. **Biomass:** The animal or plant materials which can be converted into energy is called **biomass**. The biomass can be converted into **biogas**, which is a mixture of gases produced when microorganisms decompose biomass in the presence of water but in the absence of air. Biogas is a mixture of **methane** (56 per cent), **carbon dioxide** (40 per cent) and small amount of other gases.

B. Answer the following questions, which are based on solar energy.

1. Sun is an inexhaustible source of energy. Give reason.

Ans. The Sun is an inexhaustible source of energy. It is estimated that the solar energy falling on the Earth in one hour is equal to the total energy consumption of the world in one year. The Earth receives the solar energy in the form of heat and light throughout the year.

2. What are the methods for converting sunlight into other forms of energy?

Ans. Some of the methods for converting sunlight into other forms of energy are:

Solar Photovoltaic Cell: The solar photovoltaic cell or solar cell can directly convert solar energy into electricity. A set of solar cells with rechargeable batteries is called a solar panel or solar electric power

generator. These are widely used for community lighting, pumping water, irrigation, railway signals, rural telephone system and other purposes.

Solar Thermal Appliances: The devices which can collect the scattered solar energy and converge it into a small area are called solar collectors. The **solar collectors** are used in **solar cookers,** which can cook rice, pulses and vegetables. If a black paint-coated copper or aluminium pipe is placed in an insulated box fitted with solar reflector, it works as a **solar water heater**. These are now used to heat water for bathing and cooking. When used for drying grains, fruits, vegetables or other things, then it is called **solar dryer.**

Solar Power Plants: Large concave reflectors can concentrate a large quantity of sunlight at a point called focus. The focus can attain a very high temperature. Large concave reflectors are used in solar furnaces and solar power plants. The intense heat at focus can produce steam, which can drive a turbo-generator to generate electricity.

3. How do the concave reflectors drive the turbo-generators to produce electricity?

Ans. Large concave reflectors can concentrate a large quantity of sunlight at a point called **focus**.

The focus thus attains a very high temperature. Because of the intense heat concentrated at a point can generate steam. The force exerted by the steam drives a turbo-generator to produce electricity.

4. Mention one advantage and one limitation of solar energy.

Ans. The solar energy is cleanest, pollution-free and inexhaustible source of energy. The proper use of solar energy needs large areas of land for collection and concentration.

5. Which states in India can easily use solar energy to produce electricity?

Ans. The solar energy can be used in every part of India, but Thar desert in Rajasthan can earn the distinction of being the biggest solar powerhouse which can generate between 700 to 2100 gigawatts of electricity. Nowadays solar power is used in remote areas of Haryana, Gujarat, Rajasthan and other states.

C. Answer the following questions, which are based on wind energy.

1. What was the main use of wind energy in ancient times?

Ans. In ancient times, wind energy was used for sailing ships and boats.

2. How can we convert wind energy into mechanical energy?

Ans. The velocity of the wind is generally high in the coastal areas and also on hills. The wind power is converted into mechanical and electrical energy on a large scale. Windmills are installed to harness wind power. A windmill is a device which can change the wind energy into mechanical energy. The wind energy is used to run wind-turbines that generate electricity.

3. What for the windmills were used in the past?

Ans. In the past windmills were used to grind grains into flour and drive water pumps to draw water.

4. Mention one advantage and one limitation of wind energy.

Ans. The wind energy does not need any raw material and does not produce any waste. It depends exclusively on the velocity of wind, which is controlled by natural factors. If there is no wind, then there is no power generation.

5. Name the states which have high wind potential in India.

Ans. Gujarat has the highest wind potential in India, followed by Andhra Pradesh, Tamil Nadu and Karnataka.

D. Answer the following questions, which are based on tidal energy.

1. Where can we construct a dam to use tidal energy?

Ans. We can construct a dam across a narrow opening in the sea.

2. How can we generate electricity during high and low tides?

Ans. During the high tides, when the water level rises and rising sea water moves in through the opening in the dam, it moves the turbines and generate electricity. During the low tides, when the water level falls, the stored water in the dam moves out. This can also drive the turbines and generate electricity.

3. What should be the vertical difference between high and low tides for generation of tidal electricity?

Ans. The vertical difference between high and low tides should be about 6 metres.

4. Mention one advantage and one limitation of tidal energy.

Ans. The tidal energy is renewable, pollution-free and it is also a continuous source. Severe storms in the sea can damage the power generation plant.

5. Which places in India are best suited for the utilisation of tidal energy in India?

Ans. The Gulf of Khambhat and the Gulf of Kachchh are best suited for the utilisation of tidal energy in India. The estimated potential is about 9000 MW.

E. Answer the following questions, which are based on geothermal energy.

1. How can we harness the geothermal energy to generate electricity?

Ans. The interior of the Earth maintains a very high temperature. The heat inside the Earth is called geothermal energy, which has a great potential for the production of non-conventional energy. At some places on the Earth, the hot magma is very close to the surface of the Earth. The places, under the Earth's surface, where hot magma is not very deep is called hot spot. In some areas the underground water comes in contact with hot spots and gets converted into steam. This steam can reach the Earth's surface through some crack or vent in the form of natural geyser. This naturally escaping steam can be used to run turbo-generators and thus produce electricity.

2. Mention one advantage and one limitation of geothermal energy.

Ans. This pollution-free, non-conventional source of energy does not require any raw material.

The initial expenditure on exploration, drilling and erection of geothermal power plant is very high.

3. Which place in Himachal Pradesh has a geothermal power plant?

Ans. A geothermal power plant is now working at Manikaran in Kullu district of Himachal Pradesh.

4. Name the regions which can possibly use geothermal energy to produce electricity.

Ans. The potential of geothermal energy is mostly in Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Jharkhand and Chhattisgarh.

F. Answer the following questions, which are based on nuclear energy.

1. Which heavy elements can emit radioactive rays?

Ans. Some heavy elements like **uranium** and **thorium**, emit radioactive rays, such as alpha, beta and gamma rays.

2. In what form is nuclear energy released from nuclear reactors?

Ans. In nuclear reactors, nuclear energy is released in the form of heat, which is used to convert water into steam, which runs the turbines to produce electricity.

3. Mention one advantage and one limitation of nuclear energy in India.

Ans. The available resources of nuclear energy are almost inexhaustible. The nuclear power plants are quite safe, but any lapse in safety measures can cause devastation.

4. Match the following columns:

Column A	Column B
a. Narora	1. Maharashtra
b. Jaitapur	2. Karnataka
c. Kalpakkam	3. Rajasthan
d. Rawatbhata	4. Uttar Pradesh
e. Kaiga	5. Tamil Nadu

Ans. a. 4, b. 1, c. 5, d. 3, e. 2

5. What is special about nuclear energy programme in India?

Ans. India has rich deposits of radioactive elements, such as uranium and thorium in the monazite sands of Kerala shores. The use of thorium for producing nuclear energy has made India self-reliant in nuclear fuels. India has also developed technique for reprocessing of spent fuels. The nuclear fuel resources of India are equivalent to about 700 billion tonnes of coal. But the nuclear power plants provide only 3 per cent of India's total need of energy.

The nuclear programme in India started with the setting up of Atomic Energy Establishment in 1950. India is the only developing country that has the capacity to design, build, operate and maintain nuclear power plants, manufacture all associated equipment and components, and produce nuclear fuel and special materials.

G. Answer the following questions, which are based on biogas.

1. How can we convert the biomass into biogas?

Ans. The animal or plant materials which can be converted into energy is called biomass. The biomass can be converted into biogas, which is a mixture of gases produced when microorganisms decompose biomass in the presence of water but in the absence of air.

2. Which are the main gases present in biogas?

Ans. Biogas is a mixture of methane (56 per cent), carbon dioxide (40 per cent) and small amount of other gases.

3. What are the main uses of biogas?

Ans. Biogas is a good fuel for cooking and can also be used for lighting homes and streets, pumping water for irrigation, running flour mills and other rural industries. Biogas can replace diesel for generation of motive power and electricity.

4. How can we use the leftover slurry from a biogas plant?

Ans. The leftover slurry from a biogas plant is used as manure.

5. Describe the method of producing biogas from the plant.

Ans. Method of producing biogas from the plant:

- The organic waste is mixed with water and is led to the digester tank.
- The organic waste is broken down by micro-organisms to produce biogas. Biogas is a mixture of methane (56 per cent), carbon dioxide (40 per cent) and small amount of other gases.
- If cow dung is the organic waste, then the biogas produced is popularly called gobar gas.
- The biogas is taken out through a tube and is connected to the kitchen stove.
- The biogas can also be utilised for lighting and also to run small machines.
- The semi-solid residue from the digester tank is a good quality of manure.

6. Give two advantages of biogas in India.

Ans. The decompositions of biomass in a biogas digester produces 3 to 5 times more energy than by direct burning. It is a cheap, renewable source which can dispose of large amount of rural waste and thus, is environment-friendly.

H. On an outline map of India, mark and label the following.

1. Thar desert
2. Gulf of Kachchh
3. Tattapani (Chhattisgarh)
4. Narora
5. Trombay
6. Kakrapar
7. Udaipur
8. Mandvi
9. Gulf of Khambhat
10. Ladakh
11. Rawatbhata
12. Kalpakkam
13. Kundankulam
14. Samastipur
15. Kanniyakumari
16. Manikaran (Kulu)
17. Tarapur
18. Kaiga
19. Jaitapur
20. Coimbatore

Ans. Map work