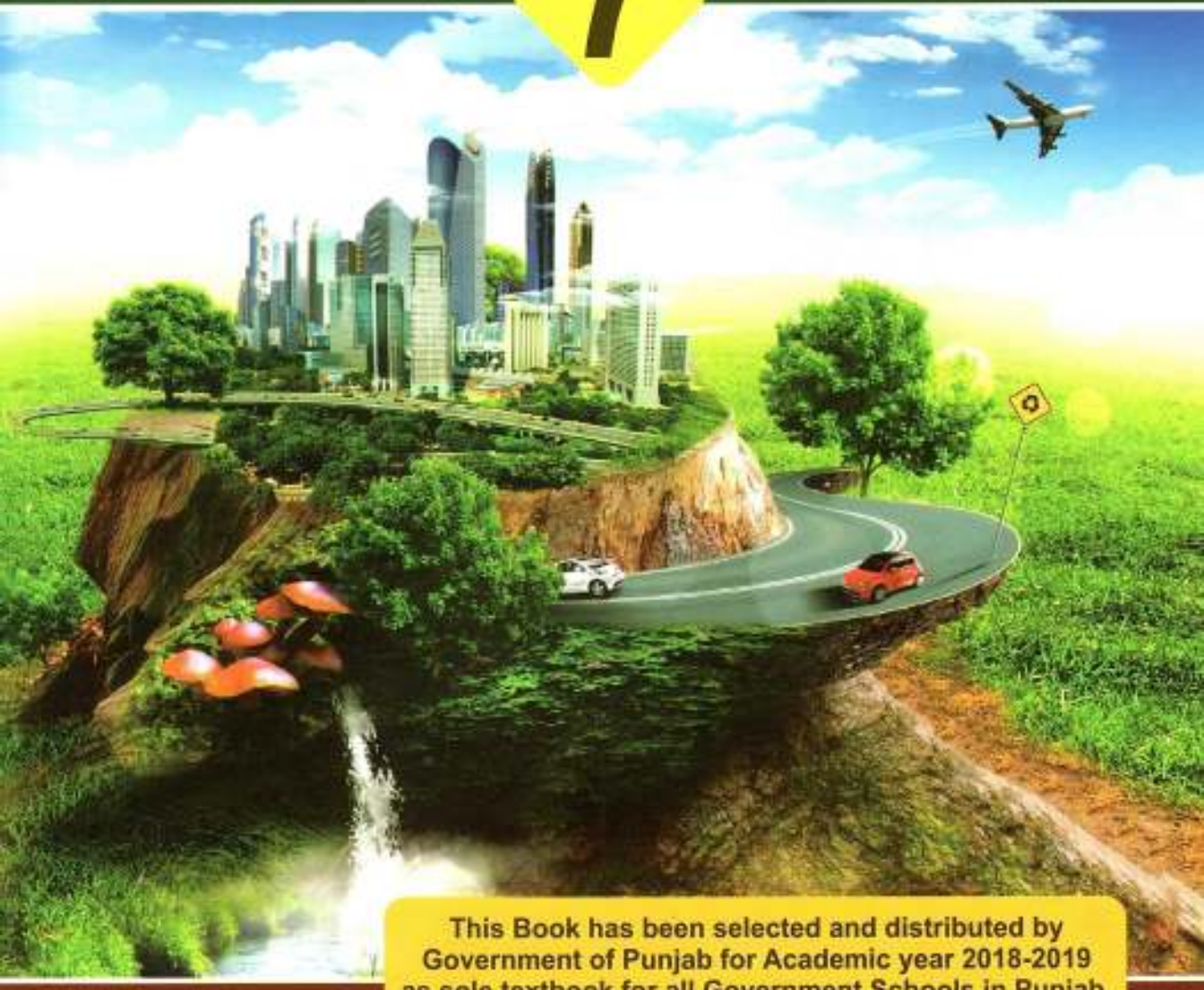
GEOGRAPHY

7



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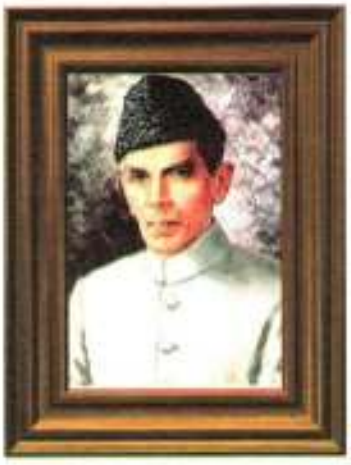

"Education is a matter of life and death for Pakistan. The world is progressing so rapidly that without requisite advance in education, not only shall we be left behind others but may be wiped out altogether."

(September 26, 1947, Karachi)

Quaid-e-Azam
Muhammad Ali Jinnah
Founder of Pakistan

قومی ترانہ

پاک سرزمین شاد باد　　کشورِ حسین شاد باد
تُو نشانِ عزمِ عالی شان　　ارضِ پاکستان
مرکزِ یقین شاد باد
پاک سرزمین کا نظام　　قُوّتِ اُخوتِ عوام
قوم ، ملک ، سلطنت　　پایندہ تابندہ باد
شاد باد منزلِ مُراد
پرچمِ ستارہ و ہلال　　رہبرِ ترقّی و کمال
ترجمانِ ماضی، شانِ حال　　جانِ اِستقبال
سایۂ خدائے ذُوالجلال

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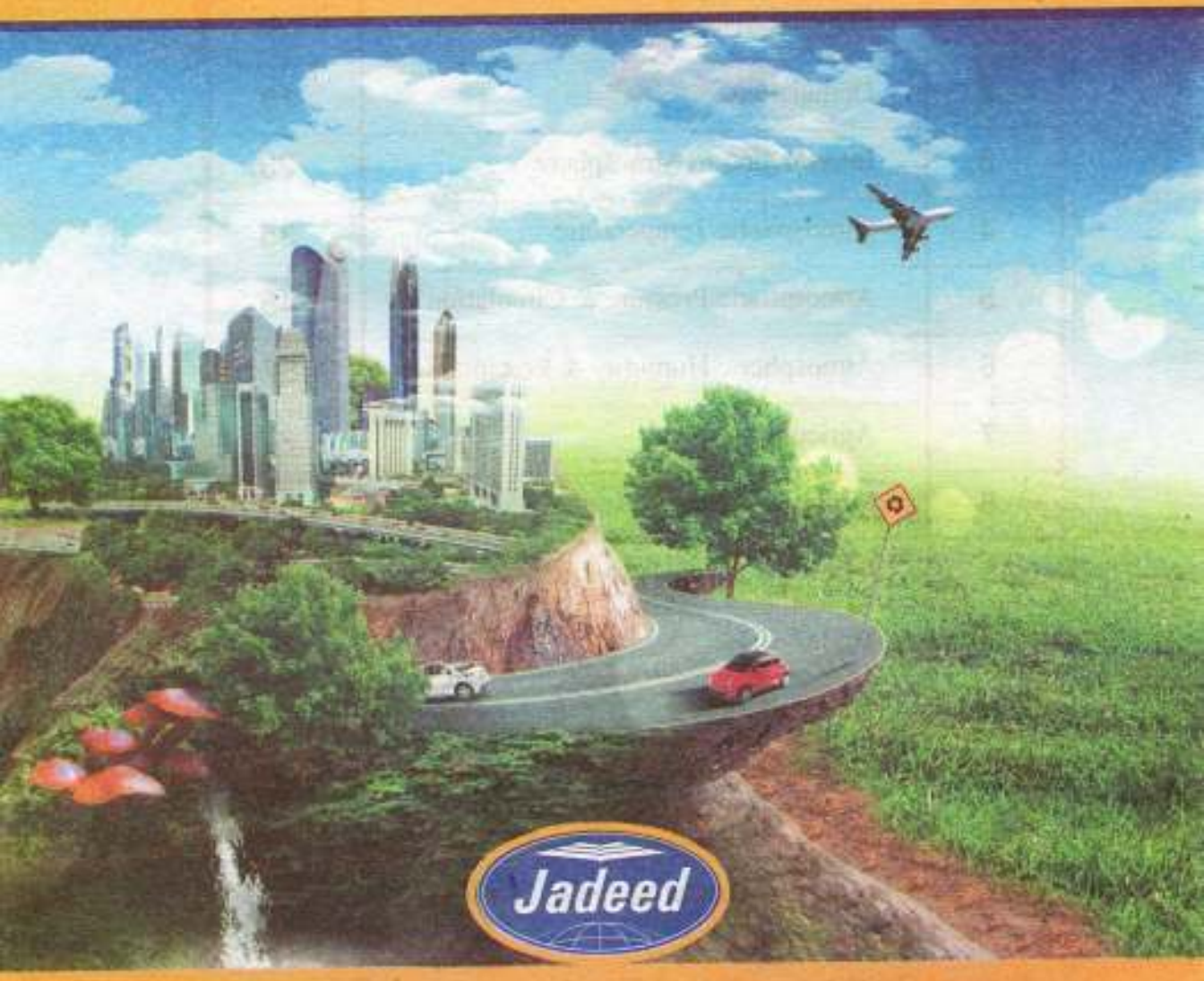
بِسۡمِ اللّٰہِ الرَّحۡمٰنِ الرَّحِیۡمِ ○

ترجمہ: "شروع اللہ کے نام سے جو بڑا مہربان نہایت رحم والا ہے۔"

GEOGRAPHY 7



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Contents

Authors: Prof. M. Kashif Ali, M.A, M.Phill
Shabana Naz M.A, M.Ed

SUPERVISION:
Shams-ur-Rehman
SS (Geo) PCTB

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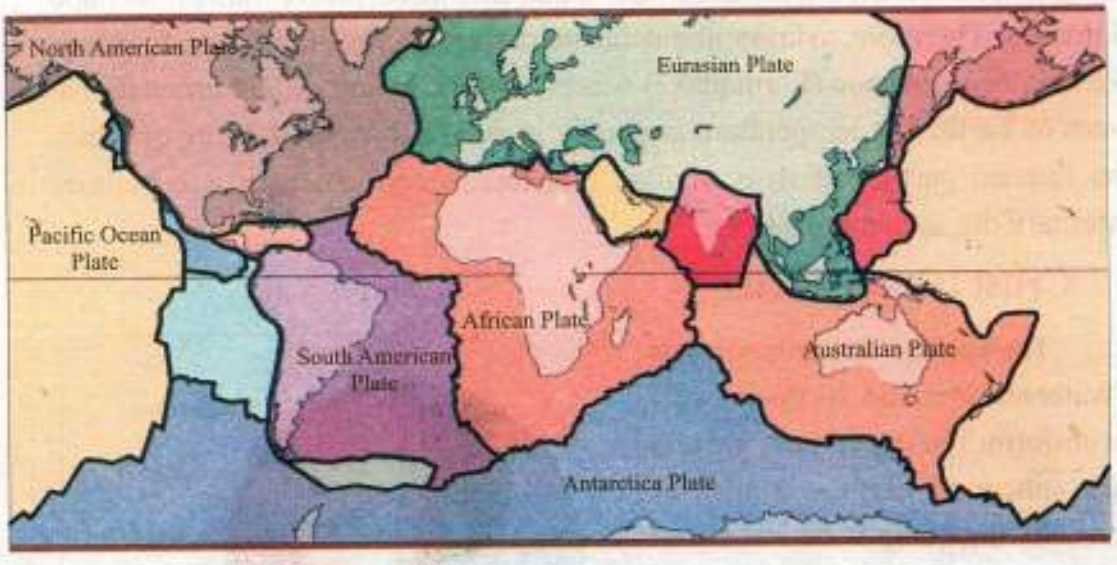
Chapter
1

PHYSICAL STATE OF THE EARTH



Students Learning Outcomes

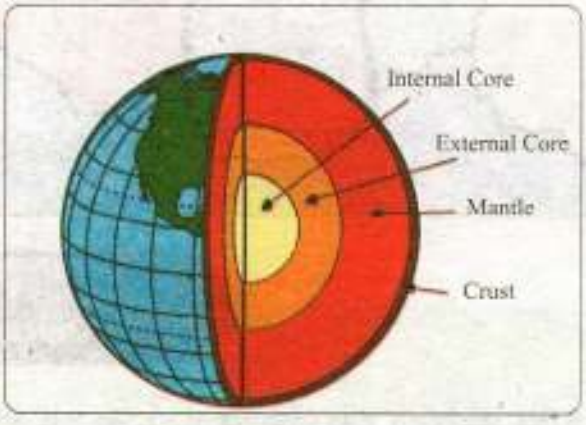
After studying this chapter students will be able to:

1. describe different Layers and composition of Earth's interior.
2. describe the basic concept of Plate Tectonics.
3. locate the seven major Tectonic Plates on a Map.
4. discuss Faults and their types.
5. describe the major Plate Faults in Pakistan and locate them on a Map.
6. describe the causes of Earthquakes, their effects and distribution.
7. list the great Earthquakes of the World and in Pakistan.
8. list Instruments and Scales used to measure Earthquakes.
9. explain Volcanism.
10. enumerate types and categories of Volcanoes and their distribution.

LAYERED STRUCTURE OF THE EARTH

Human beings have little information about the internal structure of Earth. The distance between the surface of Earth and its core (centre) is more than 6000 kilometres. Therefore, to know about the internal structure of Earth human beings take help from seismic (Earthquake) waves, and the magnetic and gravitational forces of Earth. The temperature gradually increases towards the core of Earth. The internal part of Earth is divided into three important parts i.e. Mantle, External Core and Internal Core.

1. Crust (Outer surface)



The surface of Earth consists of water and dry land. Its thickness is not uniform. The upper most and less thick sphere of Earth is known as Crust. Its thickness is between 8 to 40 kilometres. Crust is divided into two parts. The upper part is known as Continental crust and the lower part is known as Oceanic crust. The Continental crust consists of a number of land masses, known as Continents. Continental crust is made of silicon and aluminum, therefore it is also known as Sial. Oceanic crust is made of silicon iron and magnesium, therefore it is also known as Sima. This part of Earth is rich in Minerals.

2. Mantle (Middle layer)

Mantle is below the crust. It consists of two layers. Upper mantle is 670 kilometres thick. In this layer, most of the rocks are in molten state. Below the upper mantle is lower mantle which is hard and solid. It mostly consists of iron, silicon and magnesium. Its thickness is 2230 kilometres.

3. Core (Internal part)

The sphere present under mantle is called Core. It also consists of two parts i.e. external core and internal core. External core is in liquid form below the mantle. It mostly consists of molten rocks. Its thickness is 2250 kilometres. Internal core is made of nickle and iron. It is also known as "Nife". This name is derived from the initial two letters of "Nickle" and "Ferrous (iron)". The internal core is solid. It is the heaviest among all spheres. Its thickness is 1220 kilometres.

PLATES TECTONIC / MOVEMENTS

It is a reality that the existing continents were once in the form of a single mass. They divided into seven continents due to continental movements. Millions of years ago, all continents were attached with one another. So there was a single continent called "Pangea". Gradually this big continent divided into smaller parts (plates) which got the form of present continents.

SEVEN MAJOR TECTONIC PLATES

From 1960, the geographers started using two new terms for the exterior composition of Earth after getting new information about the surface of Earth. The new terms are lithosphere and asthenosphere. Lithosphere consists of the upper surface of Earth and the solid upper portion of mantle. Under lithosphere, there is soft layer of rocks known as asthenosphere. Lithosphere is divided into seven moving parts called as plates. The big plates of crust are following:

(1) Pacific Plate
(2) North American Plate
(3) South American Plate
(4) Eurasian Plate
(5) African Plate
(6) Australian Plate
(7) Antarctica Plate

Map of the Seven big Plates of the world

FAULTS AND THEIR TYPES

Big cracks or clefts in the Earth's crust are known as faults. Because of these cracks, lithosphere is divided into big and small parts. These parts are moving continuously because there are molten rocks beneath them. Due to the motion of tectonic plates, the cracks have extended hundreds of miles deep. These cracks form the boundaries between tectonic plates. These cracks are seen in the form of centres of volcanoes and earthquakes. Pacific plate is surrounded by volcanoes. Most of the earthquakes occur in this area because it is surrounded by cracks. Therefore it is also known as "Ring of Fire". Usually the faults are formed in weak area. The area where a fault forms is known as fault zone. The crack present in fault zone is called fault line. Following are the types of fault.

1. Normal Fault

In normal fault, parts of the crust move in opposite direction. Due to the removal of upper layers, lava comes out through the weak portions of Earth and volcanic eruption occurs.

Normal Fault

2. Transform Fault

When pieces of plates move forward and backward, they rub against each other. Such type of fault is called transform fault. In this fault no part of Earth moves up or down.

Transform Fault

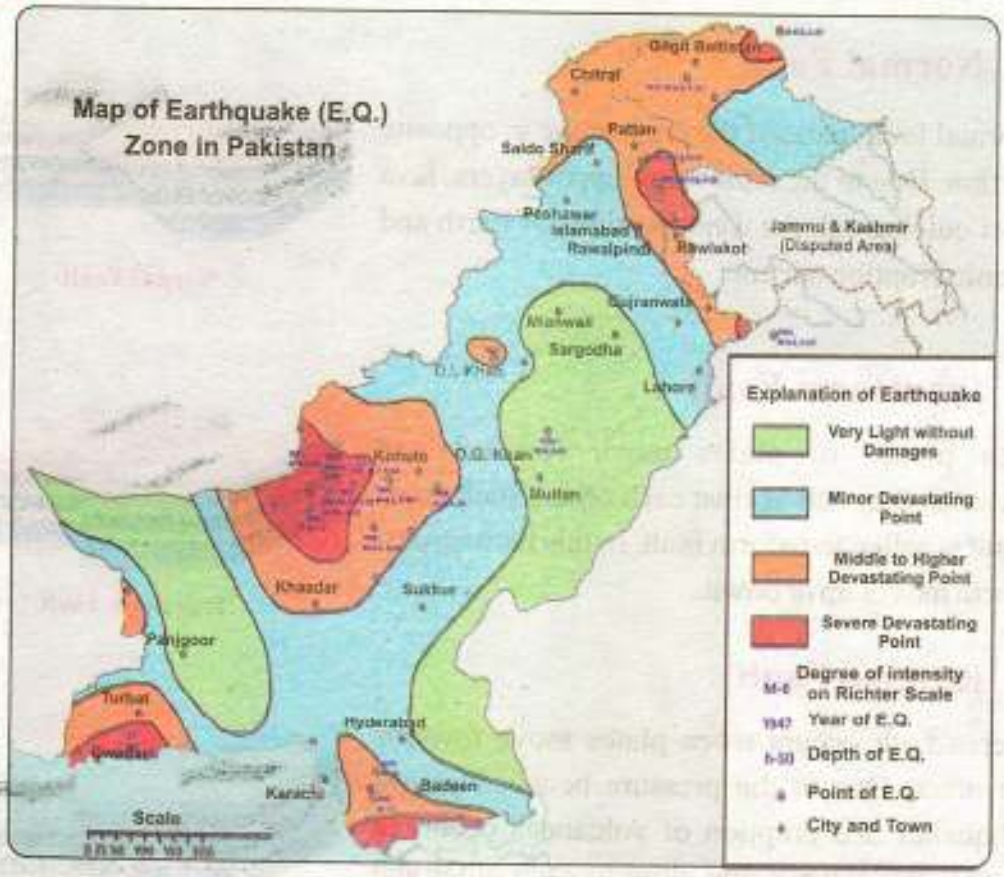
3. Reverse Fault

Reverse fault occurs when plates move towards each other. Due to the pressure between plates, earthquakes and eruption of volcanoes occur. In this way, the plates come close to each other and usually mountains are formed.

Reverse Fault

MAJOR PLATE FAULTS IN PAKISTAN

In Pakistan, two major plates unite. These plates are moving towards each other. Fault line is present in Pakistan which passes through the centre of Pakistan. This line separates Eurasian plate from Indian plate. Therefore, this region is an important centre of earthquakes. The earthquake of 8th October 2005 occurred due to the movements in these plates. Due to this earthquake, there was a great loss of human lives and materials. This region may again become centre for small and big earthquakes in future.

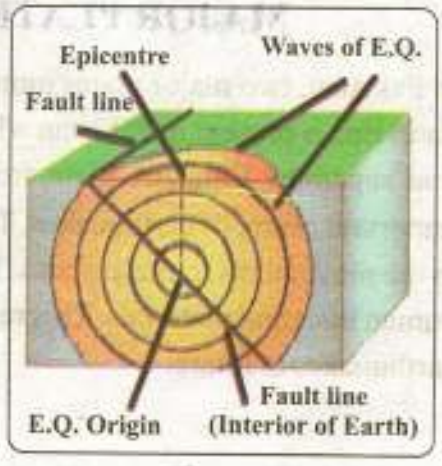


CAUSES OF EARTHQUAKES, THEIR EFFECTS AND DISTRIBUTION

Definition of Earthquake

The vibration and shaking movement at the surface of Earth is known as earthquake. Movements in the internal parts of Earth create shaking movements and vibrations at its surface. Earthquakes occur due to movement in any part of Earth. From this region, the waves of earthquake travel in all directions.

The waves of earthquake become weak as they travel away from the origin.



CAUSES OF EARTHQUAKES

The following are the two main causes of earthquakes.

1. Movements of Plates

Most of the earthquakes occur due to the movements of tectonic plates. When these plates collide with each others, the Earth surface vibrates. Wherever there is a fault line in the world, there are centres for earthquakes.

2. Volcanism

Earthquakes also occur due to volcanism. When Lava erupts out from any weak part of Earth, there is a movement on the surface of Earth. In this way volcanism becomes a cause of earthquakes.

Effects of Earthquakes

- ☆ Buildings are destroyed, people are injured, and there is a loss of lives and materials.
- ☆ The sources of irrigation are affected and standing crops are destroyed.
- ☆ The system of electricity, water and gas is disturbed.
- ☆ Sometimes, there is fire due to electricity and gas problems.

A Scene of Devastation after Earthquake

- ☆ Hurdles occur in the activities of rescue.
- ☆ There are also threats of floods.
- ☆ The facilities of transportation are disturbed after the destruction of bridges and roads.

DISTRIBUTION OF EARTHQUAKES IN THE WORLD

1. Most of the earthquakes occur around the areas of Pacific Ocean. There are small and big cracks in Earth crust in this area. These cracks look like a circle or ring. This region includes the areas of Alaska, Aleutian, Japan, Mariana, Philippines and New Guinea etc..
2. The other big centre of earthquakes in the world is Trans- Eurasian crack. This crack passes through Himalaya and Indonesian Islands and reaches Persian Gulf and Turkey. The northern and central western parts of Pakistan also come in this centre of earthquakes.

Information

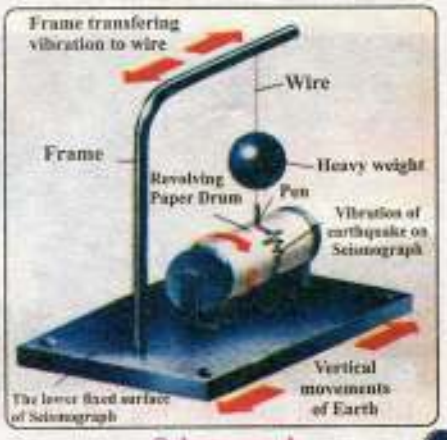
Tsunami is the word of Japanese language. It means "huge coastal waves of ocean". These coastal waves of ocean are the cause of destruction in the coastal areas. Along with the continents, the cracks of Earth are also present in the oceanic bed. Due to the motion of these cracks, earthquakes occur in oceans. When the centres of earthquakes are in the ocean floor or near coastal areas, Tsunami and big coastal waves occur. Earthquake waves produce big ocean waves in the form of huge circles. These waves strike with near and far coastal areas and destroy them. Coastal parts create obstruction in front of these waves. So the waves turn into huge oceanic waves. Due to the Tsunami of December 2004 in Indonesia, there was a great loss of lives and material.

The Great Earthquakes of the World and Pakistan

Nos.	Year	Place	Intensity on Richter Scale	Wastage of Lives
1.	1920	Guangzhou, China	8.6	2,00,000
2.	1923	Kanto, Japan	7.9	1,43,000
3.	1927	Shanghai, China	7.9	2,00,000
4.	1932	Guangzhou, China	7.6	70,000
5.	1935	Quetta, Pakistan	7.5	30,000
6.	1948	Turkmenistan	7.3	1,10,000
7.	1976	Tangshan, China	7.5	2,55,000
8.	1990	Iran	7.7	40,000
9.	1999	Turkey	7.6	17,000
10.	2003	Iran	6.6	31,000
11.	2004	Island of Northern Sumatra, Indonesia	9.0	2,83,000
12.	2005	Kashmir and Northern Areas of Pakistan	7.6	80,000
13.	2010	Haiti, Central America	7.8	1,50,000

Instruments and Scales Used to Measure Earthquakes

The instrument used to measure the intensity of earthquake is known as seismograph. The intensity of earthquakes is measured by a scale called as Richter scale. Its measurement is from 0 to 9. If the earthquake is more intense, the Richter scale shows big value.



Seismograph

VOLCANISM

The eruption of a hot semi-solid matter (Magma) from the surface of Earth is known as volcanism. During this process, the underground volcanic magma comes out on the surface of Earth in the form of lava. In this process, different rocky materials and gases are involved. Usually volcanism occurs along the cracks of Earth plates because volcanoes are mostly found in cracks or on the boundaries of the plates of Earth. About 70% volcanoes of the world are found on the bed of oceans. Such volcanoes remain hidden due to their presence in sea.

A scene of Volcanism

Flowing lava during Volcanism

Effects of Volcanism

☆ Volcanoes are formed due to volcanism. These volcanoes keep on growing by the deposition of lava layers and repeated volcanism. Such features are found on edges of Earth plates.

☆ The matter, gases and dust, etc. which come out from volcanoes cause

Clouds of gases during Volcanism

A scene of fire flames during Volcanism

environmental pollution in the nearby areas. This pollution affects human and plant lives.

☆ Sometimes, clouds of different gases are released rapidly during volcanism. Due to high temperature, a part of volcano bursts with thunder and gases are released along with the other matter. For example, in 1902 similar incident occurred in West Indies when mount pele'e erupted which caused great loss of lives.

TYPES OF VOLCANOES AND THEIR DISTRIBUTION

Volcanoes are of three types. Their detail is as under:

1. Active Volcanoes

The volcanoes in which the volcanism continues are known as active volcanoes. These volcanoes often keep on erupting lava e.g. Fujiyama (Japan), Visuvious (Italy), etc.

2. Dormant Volcanoes

A long period has gone since the eruption of lava from dormant volcanoes but volcanism can occur anytime in these volcanoes. Such volcanoes are very dangerous.

Global distribution of Valcanoes

3. Extinct Volcanoes

In some volcanoes the eruption of lava has stopped and there are no chances of eruption of lava in future. These are known as extinct volcanoes.

Distribution of Volcanoes

Volcanoes are found on the cracks of Earth plates. Most of the volcanoes of the world are found in the surrounding areas of the Pacific Ocean. Coastal areas of Pacific Ocean, in particular the eastern islands are mostly formed due to volcanism. This portion is also known as "Ring of Fire". Trans-Eurasian is the second important area where volcanoes are found. It has Australian plate, Eurasian plate and the middle part of Pacific Ocean plate. The third important area of volcanoes is the area between oceans. It is in between Atlantic and Indian oceans. This rocky area has been formed due to volcanism. It is also known as the mid-Atlantic Ridge.

IMPORTANT POINTS

- ☆ The internal structure of Earth is known through the study of earthquake waves, magnetic force of Earth and its gravitational force.
- ☆ The upper surface of Earth is known as crust, and its thickness is 8 to 40 kilometers.
- ☆ The thickness of upper mantle is 670 kms and thickness of lower mantle is 2230 kms.
- ☆ The external core of Earth consists mostly of molten rocks, and its thickness is about 2250 kms.
- ☆ The inner core of Earth is made of iron and Nickle, and its thickness is about 1220 kms.
- ☆ The Earth crust is divided into seven big plates.
- ☆ Big cracks and spaces in Earth are known as faults.

- ☆ Fault forming area is known as fault zone and crack in fault zone is known as fault line.
- ☆ The area all around Pacific plate is also known as "Ring of Fire".
- ☆ The parts of crust are moving in opposite directions in normal fault, to and fro motion in transform fault and towards each other in reverse fault.
- ☆ The instrument to measure earthquake's intensity is called seismograph.
- ☆ The scale to measure earthquake's intensity is Richter Scale.
- ☆ The eruption of hot semi-solid matter (magma) from the surface of Earth, is known as volcanism.
- ☆ Those volcanoes in which volcanism is going on are known as active volcanoes.
- ☆ A time has passed after lava eruption in dormant volcanoes but that can occur again.
- ☆ Those volcanoes in which continuous eruption is stopped, are known as extinct volcanoes.
- ☆ A large number of volcanoes are found around the areas of Pacific Ocean.

EXERCISE

I Four answers are given for every question. Mark the correct answer.

1. The thickness of the external core of Earth is:
   (a) 1250 Km (b) 1950 Km
   (c) 2050 Km (d) 2250 Km
2. The 70% of volcanoes are found:
   (a) on the bed of sea (b) in rivers
   (c) on dry land (d) on mountains
3. The thickness of upper mantle is:
   (a) 570 Km (b) 670 Km
   (c) 770 Km (d) 870 Km

4. In 1985, volcanism took place in Andes Mountain's volcano (Columbia) and the loss of lives was about?

(a) 20 thousand (b) 30 thousand

(c) 40 thousand (d) 50 thousand

5. The instrument to measure the intensity of earthquake is:

(a) Barometer (b) Hygrometer

(c) Thermometer (d) Seismograph

2 Give short answers.

1. Give two reasons for earthquake.
2. Write down the names of internal parts of Earth.
3. Write down the names of big plates of Earth.
4. What is volcanism?
5. What is the meaning of "Ring of Fire"?

3 Give answers in detail.

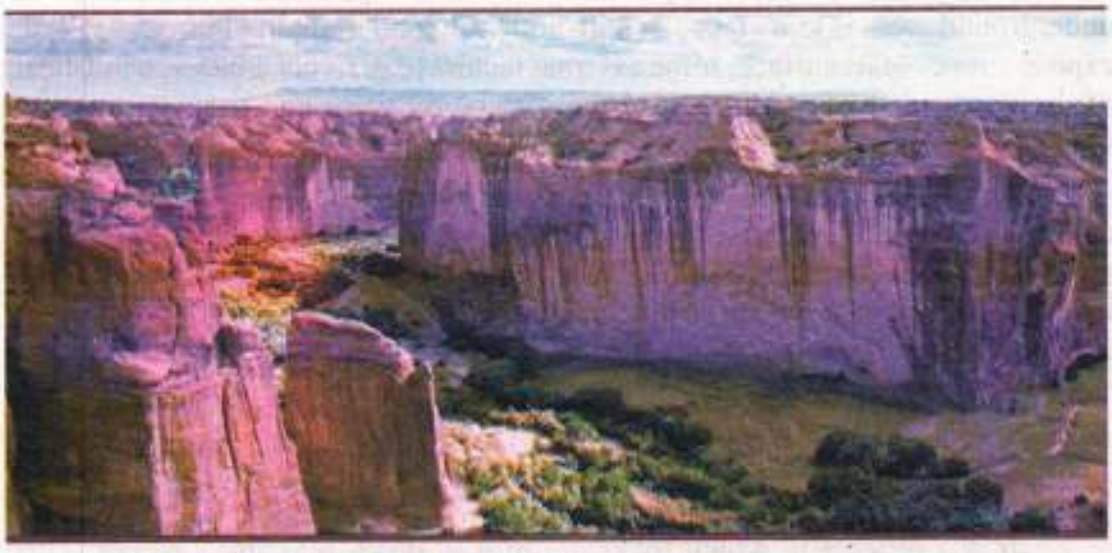
1. Explain the Composition of Earth's interior.
2. Describe the types of faults.
3. Discuss the effect of earthquakes.
4. Discuss the instruments used to measure earthquakes.
5. Make a table of larger earthquakes in Pakistan and the word.
6. Analyze volcanism and its affects.
7. Explain the types of volcanoes and their distribution.

ACTIVITIES

1. Students make chart of model of internal structure of Earth and hang it in their classroom.
2. Prepare a report about earthquakes after collecting information from newspapers, books and elders.

Chapter 2

DENUDATION



Students Learning Outcomes

After studying this chapter students will be able to:

1. define Denudation and its types.
2. describe the causes of Rock-breakup.
3. distinguish between types of Weathering.
4. define Erosion and its causes.
5. identify Erosion in local areas.
6. define Mass Wasting.
7. describe the conditions in which Mass Wasting takes place.
8. differentiate between Weathering, Erosion and Mass Wasting.
9. describe the impact of Erosion and Mass Wasting on Agriculture, Irrigation, Human Settlement and Transportation Networks.
10. recommend measures that can be taken to minimize the impact of Erosion and Mass Wasting.

DENUDATION AND ITS TYPES

Destruction of Earth's upper surface and the appearance of the surface of underground areas is known as "Denudation". As soon as internal forces of Earth expose an area of its surface, some external factors (e.g. rivers, glacier, wind, heat of the Sun and frost) start to level the surface by worn and torn process and transport the debris from its original place to new one.

This process of worn and torn on the surface and the transportation of debris is known as denudation. The term 'denudation' or destruction is used for all those factors which torn the Earth surface, waste the Earth's materials and transfer it to some other place. The following are the three types of denudation. These are also known as the methods of Denudation.

1. Weathering 2. Erosion 3. Mass Wasting

1. Weathering

It is a process in which rocks are broken down into small pieces. This process is directly or indirectly more dependent on weather conditions, heat of the Sun, and precipitation (rainfall and snow). In addition to heat and precipitation, some other factors which cause weathering are gases in atmosphere, frost, animals and plants. Following are the three types of weathering.

(a) Physical or Mechanical Weathering

Physical weathering mostly occurs in cold and dry areas. In dry and hot desert areas temperature increases prominently at day time and decreases at nights. It results in the expansion and contraction of rocks one after the other. Due to this, wear and tear process starts in rocks. It ultimately tears them in small fragments.

It is a property of water that when it freezes, it expands. When water enters in the joints, cracks and holes of rocks it freezes and expands. It results in the shattering of rocks. Even the hard volcanic rocks shatter into small fragments due to the continuous freezing and expansion of water. At high altitudes especially in high mountainous region, frost action is prominent factor of physical weathering.

In these areas, on daily basis water freezes at night and melts at day time. In the northern area of Pakistan frost action results in weakening of rocks.

The upper surface of rocks puts pressure on their lower surfaces. When rivers, glaciers and wind transfer the weight on the upper surface of Earth to another place, underground rocks appear towards upper side. Due to it, the upper surface undergoes destruction.

A scene of Mechanical Weathering due to frequent freezing and melting of water

(b) Chemical Weathering

Rocks are composed of minerals. Chemical changes occur in these minerals when they interact with water, oxygen and carbon dioxide. These changes weaken the rocks which ultimately break down. The breakage and destruction of rocks due to chemical process is known as chemical weathering.

When water interacts with the minerals of rocks, a chemical process takes place which is known as hydrolysis. When rain water enters joints, cracks and pores of rocks salts and minerals dissolve in it and form a solution. This solution weakens the rest of the rock and breaks it down into small fragments.

If any iron nail is kept outside in air for a long time it results in the rusting of iron nail. With increase in rust the nail becomes so weak that it can be broken easily. In the same way the rocks which contain iron break down by the process of oxidation.

Rocks of limestone mainly consist of Calcium carbonate. When water falls

A scene of Chemical Weathering

on these rocks, its acidity brings a chemical change in Calcium carbonate. Calcium carbonate changes into Calcium bicarbonate which easily dissolves in water. Water flows and takes away these minerals. This process of chemical weathering is known as Carbonation.

(c) Organic or Biological Weathering

When the roots of trees and bushes reach the cracks and joints of rocks, rocks face unbearable force by their growth. As a result, rocks breakdown into small fragments. Biological weathering is mainly due to plants.

Different kinds of animals like rats, rabbits, insects, ants and termites make holes in the rocks at the Earth surface for making their burrows. By this process of making holes, rocks get weakened and break down. In the soil at the surface of Earth there are crawling insects and bacteria. When these organisms respire they release carbon dioxide and water in soil. Decay of dead plants and animals produce low intensity carbonic acid which plays an important role in cracking and breaking of specifically limestone rocks. In this way biological weathering takes place.

Biological weathering also occurs by different human activities. Humans make artificial products by chemical methods. It causes environmental pollution which later results in acid rain due to which rocks get weakened. By mining , organic weathering occurs by both physical and chemical methods. During mining, rocks are broken and it is the physical weathering. By digging, hidden layers of rocks are exposed which then undergo chemical weathering.

A scene of Organic Weathering

Rocks are also broken down due to agriculture and due to the use of artificial fertilizers.

2. Erosion

The thinning and removal of the Earth surface is known as erosion. This process is mostly done by rivers, glaciers, winds and coastal waves. Therefore, these are known as the factors of erosion. These factors also transport the broken parts of rocks from their original places to new areas.

A scene of Erosion

Transportation is very important in erosion. It tends to move the materials of the rocks. When this moveable material travels over other rocks, it breaks them and scratch there surfaces and peel them off. During transportation small pebbles and boulders collide with each other and ultimately breakdown into small pieces. It must be remembered that erosion starts after weathering and mass wasting. Rocks present at Earth surface get weakened due to weathering. Their upper surface separates from lower surface. This debris washes away with rivers, winds, and glaciers,etc. These factors also transport the debris and deposit it at some other place. Mass wasting means the movement of the rock material from higher to lower region due to gravitational force of Earth. Weathering is a process in which matter on Earth surface becomes weak. Due to mass wasting this mass moves downwards.

3. Mass Wasting

Due to gravitational force of Earth, the rocks stuff travels along the slopes towards the lower areas. It is known as mass wasting. The rocks are distorted by weathering. Due to gravitational force, the rock stuff travels faster on steeper slopes as compared to less steep slopes and this process continues.

Soil creep and mud flow, etc. are the prominent movements during mass wasting. In mass wasting, soil creep is slow while mud flow is fast due to the amount of water. Soil creep is the slowest movement in mass wasting. We cannot notice its speed. Soil creep is common in hilly and semi-hilly regions. Usually in this kind, the crack appears on the corners of roads and roads are destroyed. The panels of electricity and wires are inclined. Gravitational force of Earth plays an important role in moving the stuff.

Water also plays important role in soil flow. Mass wasting usually occurs in in rainy areas. Soil flow happens on sharp slides and within few hours a portion of mountain flows downwards. The flow of mud is an important type of mass wasting. It is an environmental problem. This mud is a kind of soil debris stream. During its flow, the rain water takes away the weak and soft minerals of rock. This process occurs in few hours. If villages and other features come in its way, they are vanished for always.

People are busy in relief work after Mass wasting

The falling of big and small rock materials from high to low position is known as land sliding. In this type of mass wasting, usually the height is more and the and slope is also steeper. Rocks become weak by weathering and due to gravitational force the stones fall downwards. Due to land sliding the paths are blocked. Roads and building are distorted. If the land slide is big then it might stop the path of rivers. Due to a big land slide, a long lake has been formed near Atta Abad in Hunza valley.

DIFFERENCE AMONG WEATHERING, EROSION AND MASS WASTING

Weathering

The rocks are not transferred to any other place after breakdown. There are two other process in weathering. These are the breakdown of rocks and change of their

chemical composition. Sometimes these processes occur collectively and sometimes separately.

Erosion

In the process of erosion, the rocks break down and transfer to some other place. During erosion, not only the rocks are worn and torn but also the eroded stuff is transported to other places.

Mass Wasting

In mass wasting, the earth stuff moves from higher to lower position due to Earth's gravitational force.

IMPACTS OF EROSION AND MASS WASTING

The impacts of erosion and mass wasting on agriculture, irrigation, human settlement and transportation are explained below:

1. Impacts on Agriculture

The irrigation system consists of unpaved canals and small streams. It continuously faces erosion due to water. The fertile layer of soil present on the surface of Earth faces gradual erosion and it flows along water. There is very less plant life in such soil. The crop yield reduces. On mountains, pastures and shelters of wild life reduce in number.

2. Impacts on Irrigation

Due to erosion by water, huge amount of soil piles up at the bed of canals. As a result the water quantity in canals reduces. Due to continuous transfer of soil material along with water, the bases of dams are filled with mud. Thus their capacity to store water reduces. After some time, water is not available for irrigation system and for the production of electricity.

3. Impacts on Human Settlements

Due to flow of soil and mud and land sliding in hilly areas, there is usually a loss of lives and economy. In 1985, after land sliding in Columbia a number of villages were buried under the soil debris. Such accidents usually occur in the northern area of Pakistan.

4. Impacts on Transport System

In hilly areas, soil flow and land sliding are very common. Due to this, the roads are blocked and inhabitants of hilly areas are disconnected from the rest of world. It affects traffic system badly.

MEASURES TO MINIMIZE THE IMPACTS OF EROSION AND MASS WASTING

The impacts of erosion and mass wasting can be minimized by taking the following measures.

1. It is necessary to plant trees on the banks of canals and streams in order to stop soil erosion by water.
2. The smooth level of agricultural land is necessary so that water does not take away the soil. By planting trees on banks of crop fields, the erosion of soil can be minimized. By reducing the slope of Earth the erosion and mass wasting can be reduced.
3. To reduce erosion and mass wasting on the surface of slopes, it is necessary to stop the cutting of trees on mountain slopes and plant more trees.
4. Settlements should be avoided in areas where there is danger of erosion and mass wasting.
5. Retaining walls should be made along the roads of hilly areas.
6. Dangerous slopes should be abolished.
7. Big buildings should not be built in hilly areas,especially where there is a steeper slope.

Important Points

☆ Destruction of Earth's upper surface and the appearance of surface of underground parts is known as Denudation.

- ☆ Weathering is a process in which rocks are broken down into small pieces.
- ☆ The volume of water increases on freezing.
- ☆ When water enters the minerals of rocks a chemical reaction takes place, known as hydrolysis.
- ☆ The rocks which have iron element, are destroyed through the process of oxidation.
- ☆ The features of Earth surface are cut through erosion process.
- ☆ The rock stuff moves downward due to gravitational force. It is known as mass wasting.
- ☆ The sudden fall of rock material from high to low position is known as land sliding.
- ☆ We can reduce the soil erosion by planting trees on the bank of canals and small streams.

EXERCISE

1 Four answers are given for every question. Mark the correct answer.

(i) **Important in soil creep:**

(a) Frost (b) Snow

(c) Sun blazing (d) Water

(ii) **After destruction by weathering, the rocks:**

(a) Don't transfer from one place to another

(b) Transfer from one place to another

(c) Disappear

(d) Rise

(iii) **Which action is mostly performed by rivers, glaciers and coastal waves?**

(a) Erosion (b) Mass wasting
(c) Biological Wasting (d) Physical weathering

(iv) **Types of denudation are:**

(a) 2 (b) 3 (c) 4 (d) 5

(v) **Making artificial things through chemical process:**

(a) Reduces air pollution (b) Provides water for irrigation
(c) Creates air pollution (d) Increases agricultural production

2 Give short answers.

1. Define denudation.
2. What is the meaning of weathering?
3. Define erosion process.
4. What is the meaning of mass wasting?
5. Differentiate among weathering, erosion process and mass wasting.

3 Give answers in detail .

1. Write a note on the types of denudation.
2. Give reasons for the breakage of rocks.
3. Explain the types of weathering.
4. Write down the reasons for erosion process.
5. What are the impacts of erosion process and mass wasting on agriculture, irrigation, human settlement and transportation?
6. Suggest the ways to minimize the impacts of erosion and mass wasting.

ACTIVITIES

1. Draw the sketch of mountain, rock or hill.
2. Students explain "denudation" or "destruction" with the help of pictures.

Chapter 3

INTRODUCTION TO ATMOSPHERE

Students Learning Outcomes

After studying this chapter students will be able to:

1. describe the Atmosphere of the Earth.
2. describe the Composition of the Atmosphere.
3. discuss the significance of important gases for life on Earth.
4. describe the Layered Structure of the Atmosphere.
5. identify the basic characteristics of each Layer of the Atmosphere.
6. differentiate between Weather and Climate.
7. describe the climatic change over the Earth's surface.
8. explain the significance of Ozone as a shield layer.
9. discuss the causes and implications of Ozone Depletion.
10. list measures that can be taken to overcome the problem of Ozone Depletion.

ATMOSPHERE

Atmosphere is surrounding our Earth from all sides in the form of a cover. Due to the gravitational force of Earth, atmosphere is attached to Earth from all sides. The life on our planet– Earth – is due to this atmosphere. Atmosphere is composed of three basic elements:

i. Regular gases
ii. Variable gases
iii. Pollutants

These are mostly found in the lowest part of atmosphere.

Atmosphere

1. Nitrogen and Oxygen

Atmosphere is a combination of many gases. These gases are directly or indirectly necessary for the survival of atmosphere. About 99% of atmosphere consists of only two gases i.e. Nitrogen and Oxygen and the amount of other gases is only 1%. Atmosphere is made of about 78% of Nitrogen and 21% of oxygen.

Importance of Nitrogen

The fertility of soil depends on Nitrogen. This gas is necessary for the growth of plants. It also helps in controlling fire.

Importance of Oxygen

Oxygen is necessary for life. When we breathe, we absorb oxygen in our body. This gas interacts chemically with other elements immediately. It is absorbed in our blood. It gives us energy by burning our food. The survival of life is impossible without this gas. Oxygen helps in burning all kinds of energy resources e.g. coal, oil, natural gas, etc.

2. Variable gases

No one can deny the importance of variable gases in atmosphere. Variable gases

include carbon dioxide, water vapours and ozone. Carbon dioxide is heavier than other gases. The quantity of carbon dioxide has increased about 25% in the last two hundred years. The burning of energy sources e.g. coal, oil, natural gas,etc. produces smoke which increases the quantity of carbon dioxide in atmosphere. Similarly, the atmospheric temperature is also rising which is harmful for the survival of life. It affects global climate. The other variable gas is Ozone (O_3). In atmosphere, ozone is found about 17 to 50 kilometer above the Earth surface.

Importance of Carbon Dioxide

Carbon dioxide is necessary for life. This gas interacts with other gases and makes carbohydrates. These carbohydrates are necessary for the life of plants and animals. Carbon dioxide absorbs heat and moderates the temperature.

Importance of Ozone

Ozone stops the ultraviolet rays coming from the Sun to reach Earth. If ozone is not present in atmosphere, the high energy ultraviolet rays will become a danger for life on Earth. Such high energy rays can cause skin cancer and eye diseases. Ozone filters these ultraviolet rays before sending other rays to Earth.

3. Pollution

Air contains pollution. Minute particles are suspended in air. The smoke from factories and vehicles contains huge amounts of carbon monoxide, sulphur and carbon dioxide,etc. During burning, the smoke particles enter in air in the form of pollution.

Pollution is affecting the atmosphere of industrial cities. This is dangerous for public health. It causes diseases of throat and breathing. Pollution also contains gases which rise up in atmosphere and finish the ozone gas. In this way the amount of ozone is decreasing. The dust particles also fly from Earth surface and enter the air. Their quantity is not uniform. Their quantity is greater in deserts as compared to humid areas. Their quantity is also large in urban and rural areas.

4. Water Vapours

Water vapours are present in atmosphere in the form of gas. Among the variable gases, water vapours are very important part of atmosphere. Water vapours not only absorb heat but also help in transferring heat from one place to another. If water vapours are not present in atmosphere, there will be no cloud and rain.

The system of life depends on water vapours. Earth absorbs heat from the Sun. Due to this heat, the water of oceans and other water bodies changes into vapours by vapourization. The water vapours add to air. Their quantity in atmosphere depends on temperature. If temperature is high, the quantity of water vapours will also be high in atmosphere. Due to their presence in atmosphere, the intensity of heat and coldness remains moderate.

THE LAYERED STRUCTURE OF ATMOSPHERE

On the basis of temperature, atmosphere is divided into following layers.

1. Troposphere

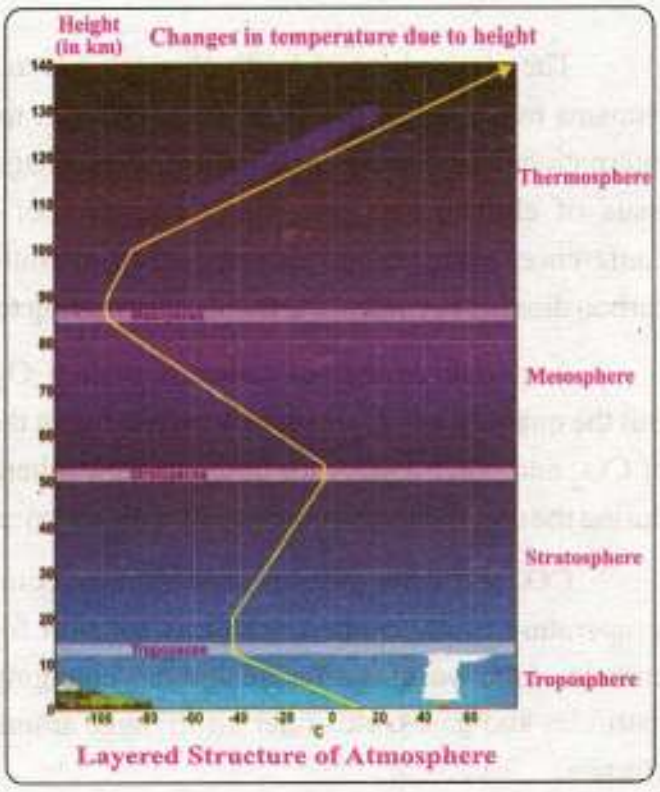
The layer near the surface of Earth is troposphere. It is necessary for all kinds of living things on Earth. All activities on Earth are due to it. All climatic changes appear in this layer,for example cloud formation, rain, winds and heat etc. These changes provide a moderate environment to Earth. The gases, water vapours and dust particles of atmosphere are present in this layer. The temperature in upper most portion of this layer is about -60 degree centigrade. The temperature in this layer decreases with height. It is present about 16 kilometers above Earth surface.

2. Stratosphere

This layer is present above the troposphere. In this layer, the temperature rises with height instead of decreasing. At its boundary, temperature reaches about 0 degree centigrade. Huge amount of ozone gas is present in stratosphere, which makes Sun rays favourable to environment. Above troposphere, this layer of stratosphere begins from 16 kilometers and ends at 50 kilometers.

3. Mesosphere

This layer is present above stratosphere. In this portion, temperature again decreases with height. At the boundary of mesosphere the temperature of air reaches about -100 degree centigrade. Here the gases of air and other particles are in minimum amounts. This layer is from 50 to 80 kilometers in atmosphere.



Layered Structure of Atmosphere

4. Thermosphere

Thermosphere extends from 80 kilometers to the final boundary of atmosphere.

In this portion of atmosphere, temperature increases with height. At the height of 350 kilometers the temperature of about 100 degree centigrade is recorded.

DIFFERENCE BETWEEN WEATHER AND CLIMATE

Weather is the whole condition of temperature, atmospheric pressure, wind speed, air humidity and precipitation (rain and snow) of a particular place at a particular time. Weather changes with time while the climate is the average weather condition of a particular place that persists there for long time. The only difference between weather and climate is that weather is the atmospheric condition of some place at particular time while climate is the atmospheric conditions of particular place during a long time.

CLIMATE CHANGE OVER THE EARTH SURFACE

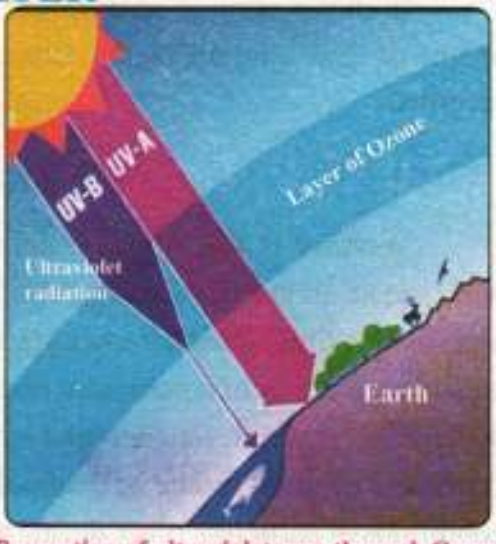
The atmosphere of Earth changes due to the activities of human beings. Humans make roads, buildings and dams etc. to fulfill their needs. In 2009, an international conference was held in Copenhagen (capital of Denmark) on the issue of climate changes. Many countries of the world participated in this conference. Many decisions were taken in conference to reduce the release of carbon dioxide to control the trend of increasing temperature on Earth.

A specific amount of carbon dioxide (CO_2) is necessary for life on Earth. But the quantity of CO_2 is rapidly increasing in the world. Increase in the quantity of CO_2 and other dangerous gases in atmosphere are due to the smoke released during the use of energy sources e.g. coal, oil, natural gas,etc.

CO_2 and other gases absorb the heat coming from Earth. It increases the temperature of atmosphere which is harmful for life on Earth. In this way the climate of the world is affected and it is changing. When volcanism occurs, dust particles and gases, etc. enter air in huge amounts. It also results in changes in climate.

SIGNIFICANCE OF OZONE LAYER

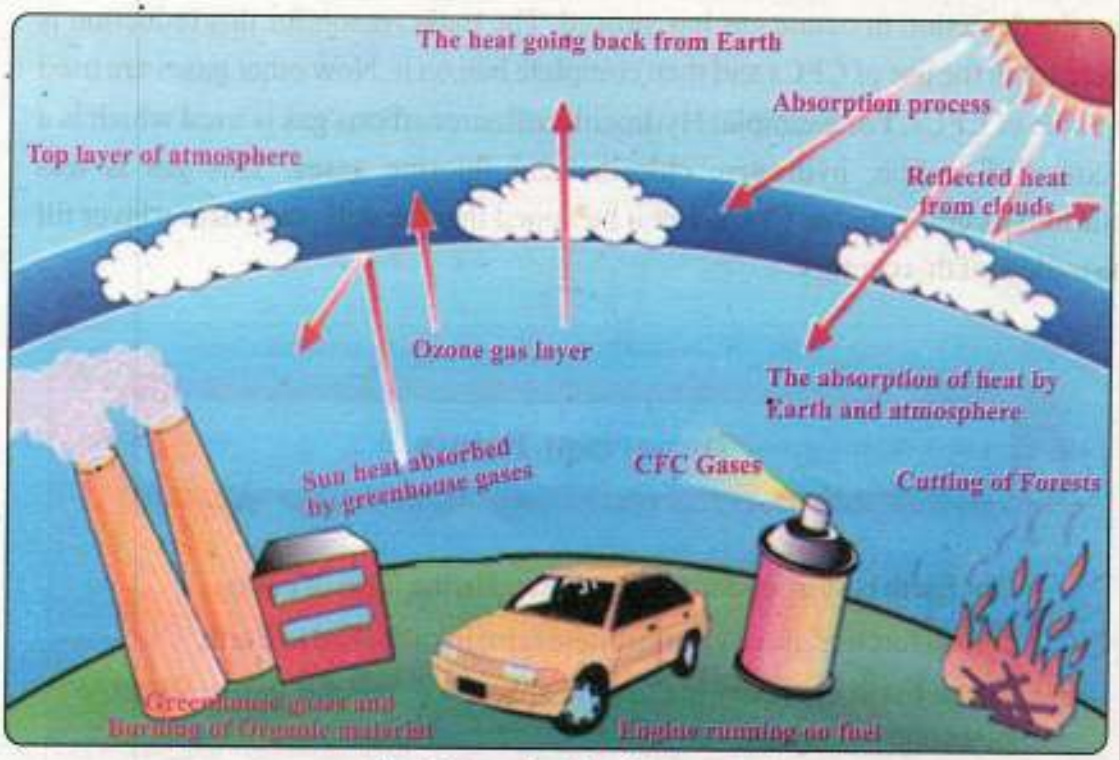
One of the atmospheric gases is Ozone. Ozone is produced and destroyed naturally. It is present in the upper portion of atmosphere. It absorbs ultraviolet rays and sends other Sun rays to Earth after filtration. In this way life is protected from ultraviolet rays. Ultraviolet rays cause skin cancer and eye diseases. If the quantity of Ozone gas decreases, the ultraviolet rays will reach Earth, which is harmful for life. Therefore, the presence of ozone is necessary.



Prevention of ultraviolet rays through Ozone

CAUSES OF OZONE DEPLETION

The information gathered from satellite helps us in studying Ozone gas. The layer of Ozone has become thin at different places. One of the main reasons



The Dangers faced by Ozone gas

for reduction and destruction of Ozone gas is CFCs gas which is mixture of Chloro-Flouro-Carbon. It contains Flourine and Carbon atoms. This mixture enters atmosphere and breaks the Ozone gas. Human activities are also destroying Ozone gas. CFCs is used to keep refrigerator cool and in different sprays. CFCs is released from such instruments and destroys Ozone.

Measures to Overcome the Problem of Ozone Depletion

In the last few years different countries have taken good steps for the reduction of CFCs and there are better results. The information about Earth that was collected from National Aeronautics and Space Administration and other sources shows that the depletion in ozone gas has slowed. The main reason for this reduction is decrease in the use of CFCs and then complete ban on it. Now other gases are used in place of CFCs. For example, Hydrochloroflourocarbons gas is used which is a mixture of carbon, hydrogen, chlorine and fluorine gases. This gas is less injurious as compared to CFCs. Let it be hoped that we will save ozone layer till the middle of this century.

Important Points

- ☆ Our Earth is surrounded by atmosphere in the form of cover.
- ☆ Due to force of gravity atmosphere remains attached to Earth.
- ☆ Three basic elements make atmosphere i.e. regular gases, variable gases and pollutants.
- ☆ About 99% of atmosphere contains only Nitrogen and Oxygen
- ☆ Oxygen helps in burning all kinds of energy sources e.g. coal, oil, natural gas etc.
- ☆ Carbon dioxide absorbs heat and moderates the temperature.
- ☆ Ozone stops dangerous ultraviolet rays to reach Earth.
- ☆ The layer of atmosphere near Earth is known as troposphere.
- ☆ The whole condition of temperature, atmospheric pressure, wind speed, air humidity and precipitation of a particular place at a particular time, is known as weather.

☆ Climate is the average weather conditions of a particular place for a long time.

☆ CFCs gas is the mixture of carbon, hydrogen, chlorine and fluorine gases.

Exercise

1 Four answers are given for every question. Mark the correct answer.

(i) The layer of atmosphere near Earth is known as:

(a) Mesosphere (b) Stratosphere

(c) Thermosphere (d) Troposphere

(ii) What is the distance of atmosphere from the surface of sea?

(a) 60000 Km (b) 70000 Km

(c) 80000 Km (d) 90000 Km

(iii) Which gas is used for cooling in refrigerator?

(a) Oxygen (b) Nitrogen

(c) Carbon dioxide (d) CFCs

(iv) The main ingredients for atmosphere are:

(a) Three (b) Four

(c) Five (d) Six

(v) What is the temperature of air at the boundary of Mesosphere?

(a) About -90 degree centigrade

(b) About -100 degree centigrade

(c) About -150 degree centigrade

(d) About -200 degree centigrade

2 Give Short answers.

(i) What is atmosphere?

(ii) Explain the difference between weather and climate.

(iii) What is Mesosphere?

(iv) Write down any two reasons for reduction in ozone.

3 Give answers in detail.

(i) Explain the importance of carbon dioxide and oxygen.

(ii) Explain the composition of atmosphere.

(iii) Discuss in detail the layers of atmosphere.

(iv) Discuss in detail the change in climate on the Earth surface.

(v) Describe the importance of Ozone layer.

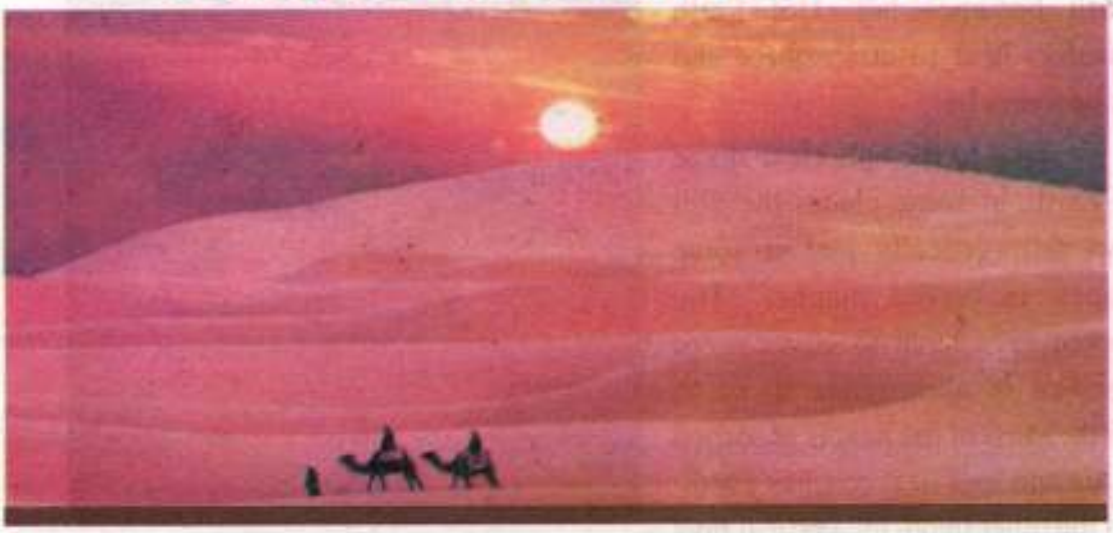
(vi) Suggest the measures to control reduction of Ozone.

Activities

1. Arrange a discussion on the reasons for reduction in Ozone gas.
2. Write down names of five items in which CFC gas is used.

Chapter 4

ATMOSPHERIC TEMPERATURE



Students Learning Outcomes

After studying this chapter students will be able to:

1. define Atmospheric Temperature.
2. describe Scales and Instruments used in measurement of Temperature.
3. explain how Earth and the Atmosphere are heated.
4. discuss vertical variations in Temperature.
5. describe the phenomenon of Inversion of Temperature.
6. describe the Horizontal Distribution of Temperature and the factors influencing it.
7. define Isotherms and state how they vary over land and water.

Atmospheric Temperature

Sun is the biggest source of heat and light. Sun rays carry heat along with light to Earth. Life on Earth needs this heat for survival. When these rays pass

through atmosphere, about half of them are reflected. Therefore about half of them reach Earth. When these rays strike Earth, few of them are reflected back and few are absorbed by Earth. So Earth becomes hot. Hot Earth transfers heat to atmosphere and air becomes hot.

Sun

Due to the spherical shape of Earth, at some places the Sun rays fall vertically and at some places in curved manner. The curved rays have to cover more distance in atmosphere to reach Earth. Most of the heat is absorbed in air and less heat reaches Earth. On the other hand, the vertical rays have to cover less distance. Therefore less heat is absorbed in air and more heat reaches on Earth.

Moreover, curved rays spread over more space on Earth. So their intensity decreases. Vertical rays spread on small portion of Earth, therefore their intensity is high. Due to these two reasons, temperature does not increase with curved rays but increases due to vertical rays. In this way the equatorial regions are hot due to vertical rays and polar areas are cold due to curved rays.

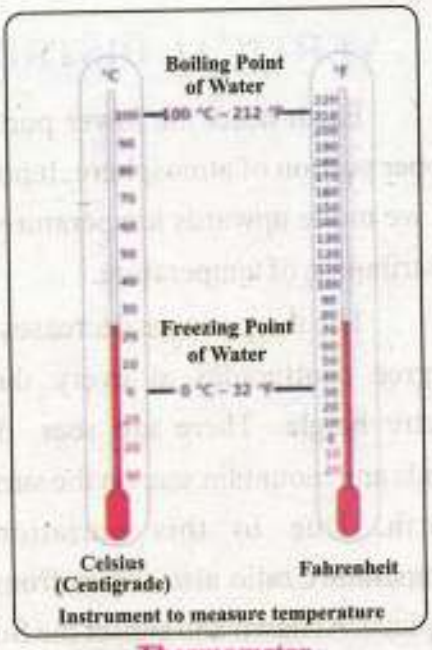
SCALE AND INSTRUMENTS USED IN MEASUREMENT OF TEMPERATURE

The degree of hotness and coldness of a particular place is known as temperature. In climatic studies the meaning of temperature is the temperature of air. Temperature is measured by an instrument called thermometer. Thermometer is made of narrow glass tube in which a specific amount of mercury is filled. From the tube, all air is removed to finish the effects of air pressure. This tube is divided into different grades. Matter expands on heating and contracts on cooling.

According to this principle, the mercury or alcohol present in thermometer expands and contract and indicate different readings of heat. Two scales are used to measure these degrees:

1. Celsius Scale
2. Fahrenheit Scale

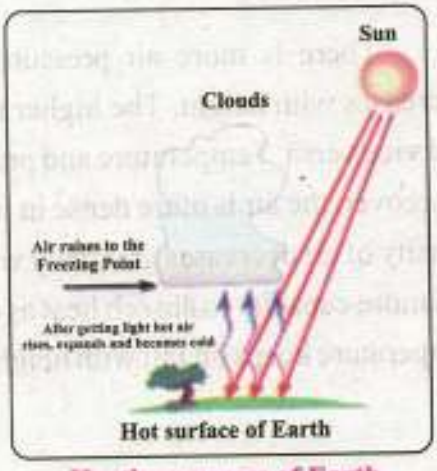
Thermometer has three main levels. Boiling point is the temperature at which water starts boiling. Freezing point is the temperature where water starts turning into ice. Absolute zero is the minimum possible temperature of any matter. It is impossible to have temperature below absolute zero.



Thermometer

HEATING OF EARTH AND THE ATMOSPHERE

Surface of Earth is not uniform. Somewhere there is water and somewhere there is dry land. The dry places become hot and cold more rapidly than the wet places. So the continents become hot during summer and cold during winter. Sun rays heat Earth surface without heating atmosphere. Earth sends this heat back to atmosphere. As this heat is transferred from lower side, the lower portion of atmosphere hotter and the upper portion is cooler. Earth gets heat from Sun rays during day time and releases heat at night. Atmosphere releases this heat slowly. The areas which are covered by snow, their white colour reflects more Sun rays. The areas with dark coloured rocks absorb heat and reflect less Sun rays. Such dark areas are comparatively more hot. When the rays absorbed by the Earth are released, heat is transferred to atmosphere.

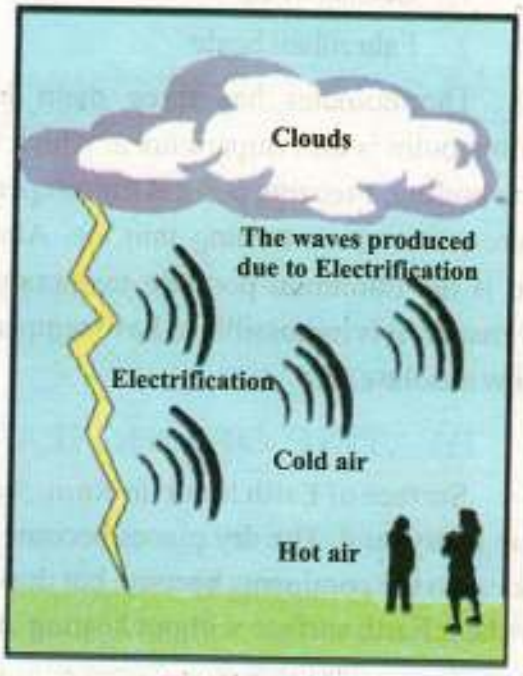


Heating process of Earth

VERTICAL DISTRIBUTION OF TEMPERATURE

Earth heats the lower portion of atmosphere. Then this heat reaches the upper portion of atmosphere. It proves why the lower atmosphere is more hot and as we move upwards temperature keeps on falling. This is known as the vertical distribution of temperature.

The temperature decreases by 6.5 degree centigrades at every thousand metre height. There are seas, deserts, lands and mountain, etc. on the surface of Earth. Due to this variation, the temperature ratio also varies from place to place. At dawn and sunset the Sun rays fall on Earth in curved manner, so there is less heat. At 12 O' clock of noon, the Sun rays fall vertically on Earth so there is more heat.



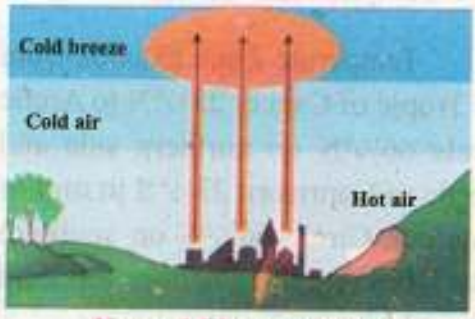
Hotness of Air

Air Pressure

There is more air pressure in the lower portion of atmosphere and it decreases with height. The higher the temperature the lower will be the pressure and vice versa. Temperature and pressure are inversely proportional to each other. Moreover, the air is more dense in lower areas. This air contains heavy gases. The density of air decreases gradually with height. Lighter gases enter it. The dense air has more capacity to absorb heat as compared to less dense air. Due to this reason, temperature keeps on fall with height.

INVERSION OF TEMPERATURE

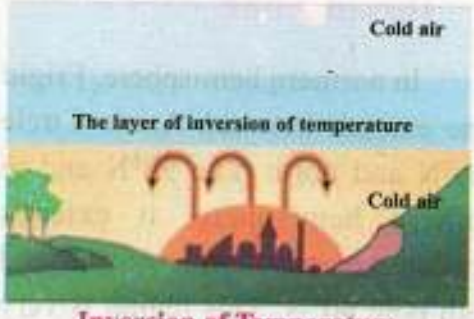
Vertical distribution of temperature explains that temperature decreases with height. But at certain places it reverses and temperature rises with height. If the temperature at Earth surface is 5°C then it is 7°C above this point. This reverse situation of temperature is known as inversion of temperature.



Normal Circumstances

Reason of Inversion of Temperature

Sometimes during winter season after the sunset the weather becomes clear. In this situation, Earth's heat releases rapidly and its surface becomes very cold. As the air near Earth surface touches the cold surface, it also becomes cold. But the air above it remains comparatively hot and light in weight.



Inversion of Temperature

HORIZONTAL DISTRIBUTION OF TEMPERATURE

Equatorial region remains hot throughout the year and average temperature is 32°C. On contrary arctic regions remain very cold and temperature remains below freezing point. Such unequal distribution of temperature on the surface of Earth is known as horizontal distribution of temperature.

On the basis of horizontal distribution of temperature the surface of Earth is divided into three zones.

1. Tropical Zone

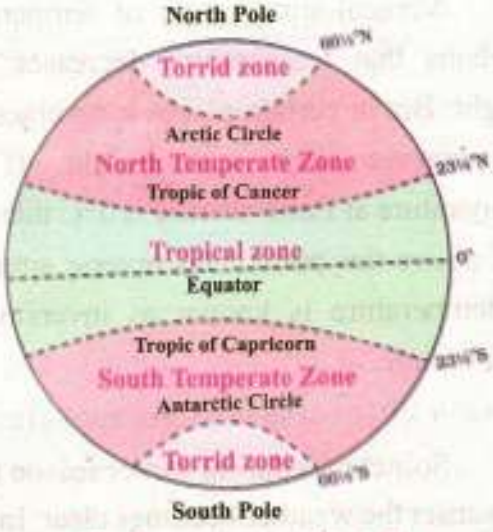
It is a hot region which extends on both sides of the equator. It extends from the Tropic of Cancer 23 ½°N on northern side to the Tropic of Capricorn 23 ½°S on

2. Temperate Zone

Temperate Zone extends from the Tropic of Cancer 23½°N to Arctic Circle 66½°N on northern side and Tropic of Capricorn 23½°S to mid of Antarctic Circle 66½°S on southern side. This region is neither too cold nor too hot.

3. Torrid Zone

In northern hemisphere, Frigid Zone extends between Arctic Circle 66½°N and north pole 90°N and in southern hemisphere, it extends between Antarctic circle 66½°S and south pole 90°N. This region is very cold.



The Important regions of Temperature on Earth

THE FACTORS INFLUENCING HORIZONTAL DISTRIBUTION OF TEMPERATURE

Following factors influence the horizontal distribution of temperature:

1. Water and dryness

The percentage of water and dryness on Earth surface is 71% and 29% respectively. The dry places or continents are heated rapidly. After sunset, they are cooled within short span of time. On the other hand water or oceans takes time to be heated or cooled. During summer, the dry place becomes much hotter than the water area. It is due to the differences in the structure of Earth.

2. Sun rays

As it is already discussed that Sun rays fall vertically on equatorial region, due to which they give more heat. Sun rays fall in curved manner in polar regions, due to which these regions have low temperature.

3. Land and Sea Breezes

Winds flow from hot to cold and from cold to hot regions. It results in temperature fluctuation. The examples are land and sea breezes, mountainous breezes and valley breezes. Although there is no coldness in Karachi but sometimes cold breezes of Quetta hit Karachi and there is coldness.

4. Ocean Currents

Also travel from hot to cold and from cold to hot regions. When a hot wave reaches a cold area, it increases temperature of that area. For example when a hot wave of northern Atlantic Ocean reaches the coast of western Europe, it increases its temperature and this coast does not freeze even in winters. Similarly, cold currents reduce temperature of hot regions. For example, when Canary current moves along western coast of Africa it reduces its temperature.

5. Clouds

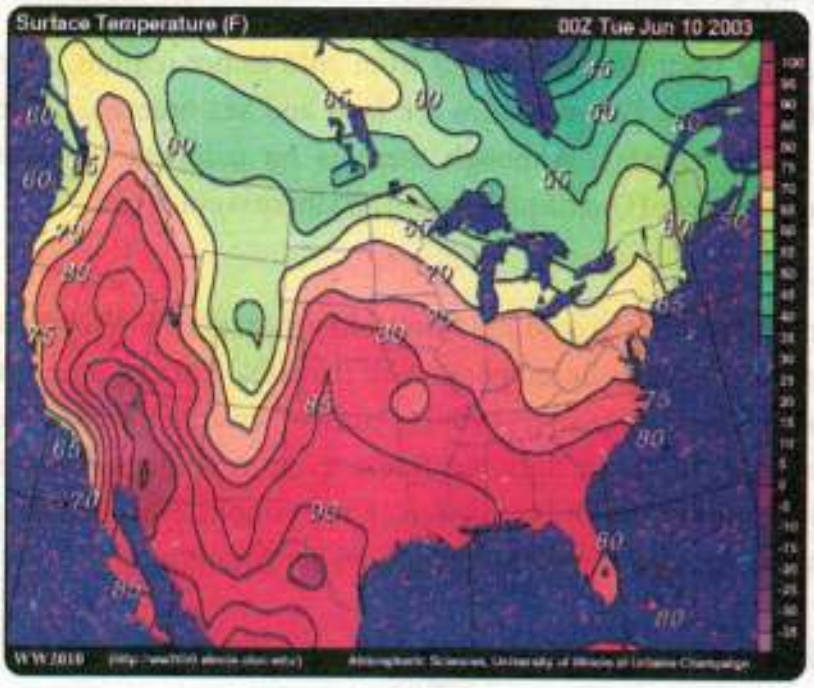
Clouds reflect most of Sun rays and allow a few Sun rays to reach Earth. It reduces the temperature of Earth. Therefore the cloudy areas have low temperature.

6. Coastal Regions

Coastal regions do not become hot even if they are near equator. It is due to sea breeze. As Karachi has moderate temperature throughout the year while the temperature of Lahore increases during summer and decreases during winter.

Isotherms

Isotherms help to mention the horizontal distribution of temperature. These lines join the areas of same temperature on map. These lines are mostly parallel to latitudes. They are inclined towards equator in summer and inclined towards poles in winter. In southern hemisphere, the water area is large as compared to dry area. Hence in this hemisphere, in summer and winter these lines are parallel, without any prominent curves.



Isotherms

MAIN POINTS

- ☆ Sun is the biggest source of heat and light.
- ☆ Due to spherical shape of Earth some rays fall in curve manner on Earth while some fall vertically.
- ☆ Thermometer has three main levels which are freezing point, boiling point and absolute zero.
- ☆ Earth heats the lower portion of atmosphere and then this heat reaches the upper layers of atmosphere.
- ☆ Tropical zone is a warm region, which extends on both sides of equator.
- ☆ Temperate Zone extends from mid of Arctic Circle on northern side to

- ☆ The percentage of water areas and dry areas on Earth surface is 71% and 29% respectively.
- ☆ Coastal regions do not become hot even if they are near equator because of sea breeze.
- ☆ Isotherms help to show the horizontal distribution of temperature.
- ☆

EXERCISE

1 Four answers are given for every question. Mark the correct answer.

(i) What indicates the horizontal distribution of temperature?

(a) Isotherms (b) Latitude
(c) Longitude (d) Equator

(ii) On heating, the matter:

(a) Expands (b) Contracts
(c) Increases (d) Decreases

(iii) After every thousand meters, average °C temperature decreases about:

(a) 4.5 (b) 5.5
(c) 6.5 (d) 7.5

(iv) The ratio of dryness on the surface of Earth is:

(a) 29% (b) 66%
(c) 33% (d) 28%

(v) What is the atmosphere of Fridged Zone?

(a) Hot (b) Moderate
(c) Less cold (d) Too much cold

2 Give short answers.

1. Define temperature.
2. Give names of instruments and scales to measure temperature.
3. What is the meaning of Isotherm?

3 Give answers in detail.

1. Explain the horizontal distribution of temperature.
2. Explain the vertical distribution of temperature.
3. Elaborate the factors which change temperature.

ACTIVITIES

1. Do a practical for measuring temperature with the help of thermometer.
2. Write down the five advantages of Sun rays on a chart and hang it in classroom.

Chapter 5

ATMOSPHERIC PRESSURE AND CIRCULATION

Students Learning Outcomes

After studying this chapter students will be able to:

1. explain Air Pressure.
2. describe how Air Pressure decreases with increasing height.
3. describe the relationship between Temperature and Air Pressure.
4. discuss Air Pressure Belts on the Globe.
5. explain the circulation of Winds (Permanent, Seasonal and Local winds).
6. describe Cyclones, their types, movement and distribution.

Air Pressure

Air pressure is important for the study of weather and climate. Like every matter, air has weight. This weight of air is called air pressure. Barometer is the

instrument used to measure air pressure. As height is measured from sea level, air pressure is also measured in reference with the sea level. The average air pressure is about 1013 millibar near equator. Millibar is the unit to measure air pressure. Centimetre and inch are also its units. Air pressure is not uniform on Earth surface.

Barometer

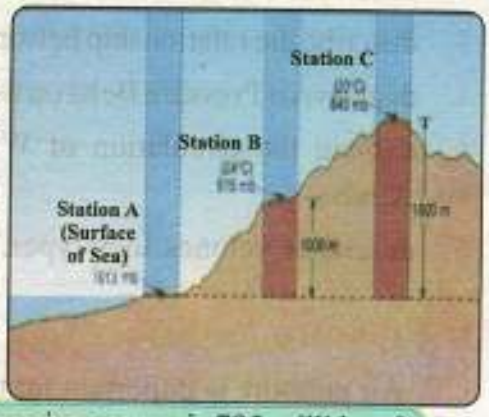
Isobars

Lines are made on maps to indicate air pressure. The regions having same air pressure are joined by lines. Such lines are known as Isobars.

Isobars

Air Pressure and Height

Atmosphere extends very high from Earth surface. Due to the heaviness of air the air pressure is highest at the lower portion of atmosphere. This pressure decreases with height. This is the reason that air pressure is more on sea and less on mountains. We can find the height of a mountain if we know the air pressure at the peak and foot of mountain.



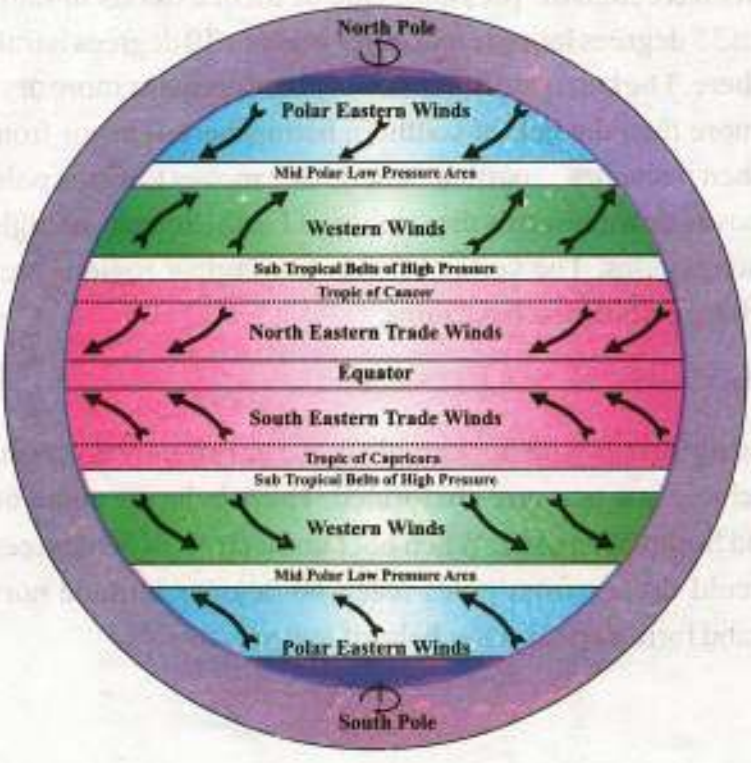
Do you know that at the height of 2000 metres, air pressure is 795 milli bars?

RELATIONSHIP BETWEEN TEMPERATURE AND AIR PRESSURE

The temperature and air pressure are inversely proportional. The areas where air pressure is low have high temperature and vice versa. Air spreads and becomes light on heating. Air pressure decreases when air becomes light in weight. On the other hand, when air is cooled it contracts and becomes heavy. Air pressure increases when air becomes heavy. Air contains water vapours which are lighter than air. The addition of water vapours in air makes it light and air pressure decreases. It is a principle that humid air is lighter than dry air and its pressure is also low.

AIR PRESSURE BELTS ON THE GLOBE

Sun rays fall on the equator vertically throughout the year. Due to the spherical shape of Earth, the Sun rays fall in curved manner on poles. Vertical rays give more heat to Earth than curved rays. Therefore temperature decreases from equator towards poles. Thus poles have severe coldness and have snow throughout the year. Hence, due to this difference in temperature the air pressure



also decreases gradually from poles to equator. The occurrence of air pressure belts on Earth is explained as following.

1. Equatorial belt of low pressure
2. Sub-tropical belts of high pressure
3. Sub-polar belts of low pressure
4. Polar belts of high pressure

1. Equatorial Belt of Low Pressure

This is a belt of low air pressure. It is formed due to heat at about 5 degree north and south of equator. This belt has summer throughout the year. Air becomes light because of heat. It moves vertically upwards in the form of convectional currents. A belt of low pressure also forms here. It is known as belt of calms. Here, air lifts upwards instead of flowing along the Earth surface. Due to it, atmosphere shows calmness.

2. Sub-tropical Belts of High Pressure

These belts have high air pressure. One of them extends in mid southern hemisphere about 35 degrees latitude and other is about 30 degrees latitude in mid northern hemisphere. The belt of northern hemisphere contains more dry areas. So its extension is more than the belt of southern hemisphere. The air from equator lifts upwards. When it reaches particular heights it moves towards poles. Due to its heaviness it moves down towards the surface of Earth. So belts of high pressure are formed in such regions. The vertical winds from upper regions are cold and dry. Due to this, these belts do not have rains.

3. Sub-polar Belts of Low Pressure

When cold air strikes with hot humid air, the hot air moves upward. Due to this, sub-polar belts of low pressure are formed. These belts are about 60 degrees latitude North and South of equator. When hot humid air from 30 degrees latitude north-south and cold dry air from poles reach 60 degrees latitude north-south, these airs collide and form the sub-polar belts of low pressure.

4. Polar Belts of High Pressure

These belts are on both sides in Polar regions. Temperature remains below freezing point all the year. So belts of high pressure are formed, known as polar belts of high pressure.

WIND SYSTEM

Air always travels from area of high pressure to the area of low pressure along the surface of Earth. Winds are named after their dimensions. The types of wind that flow along the Earth are explained as following:

1. Permanent Winds

The winds which blow between the belts of air pressure in the same direction throughout the year, are known as permanent winds. These winds are divided into three types:

(i) Eastern Winds

These are a type of permanent winds. These winds blow from sub-tropical regions towards equator, between 30-50 degree latitude. These are called eastern because they come from east. These are also called trade winds because in ancient times ships used their direction for business travels. These winds bring rains on the eastern coasts of continents.

(ii) Western Winds

These are second type of permanent winds. These winds travel from sub-tropical belts of high pressure to sub-polar belts of low pressure about between 35-60 degree latitude. As they come from west, they are called western winds. Their direction is opposite to trade winds. In the regions of the winds, rains usually become low from west to east. These winds cause rains throughout year but there is more rain in winter as compared to summer. The reason is that the dry places have severe cold during winter.

(iii) Polar Winds

Third type of permanent winds is polar winds. These winds travel from the polar belts of high pressure to sub-polar belts of low pressure between about

60 degrees latitude in both hemispheres. As these winds travel from east to west that is why these are also known as Polar Eastern winds. In northern hemisphere, these winds travel from North-Eastern side to South-Western side. In southern hemisphere, these winds travel from South-Eastern side to North-western side. These wind travel from severe cold regions to less cold regions that is why they are dry. They cause less rain and snowfall, which is mostly on oceans. Their speed is very fast. Sometimes they blow in the form of storms. When these winds reach sub-polar low pressure belts, they mix with western winds and form moderate cyclones.

2. Seasonal Winds

The winds which change their direction with season are known as seasonal winds. In geographical terms, the monsoon winds are the winds which travel from sea to dry area during six months of summer and from dry area to sea during six months of winter.

During summer, the winds coming from sea are filled with water vapours. Therefore they bring heavy rains in eastern sides of continents. On the other hand, during winter monsoon winds come from dry area and are dry. So these areas of continents do not have rainfall. They are divided into summer and winter monsoon winds.

In Pakistan, the rainfall in summer is due to monsoon winds. These winds travel from sea to dry places during summer. They are filled with moisture. In our country, it is severe heat during April, May and June. The temperature rises during day time due to which air also becomes hot. As hot air is light, so it moves in upward direction. On the other hand, temperature is low in the Bay of Bengal and Arabian Sea and the air is cold.

In summer, winds move from sea to dry places and they are full of moisture. Himalayas is in their way and they change their direction from north to west. These winds bring more rains in North-Eastern region of Pakistan and bring less rains in South-Western regions. In Pakistan, most rains are due to monsoon

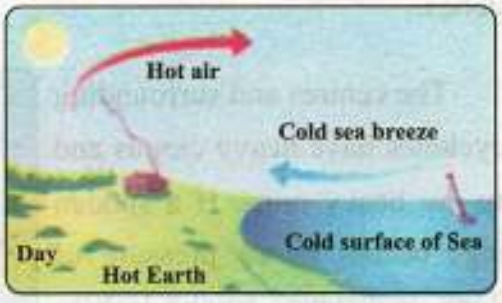
winds in summer. They blow from July to September.

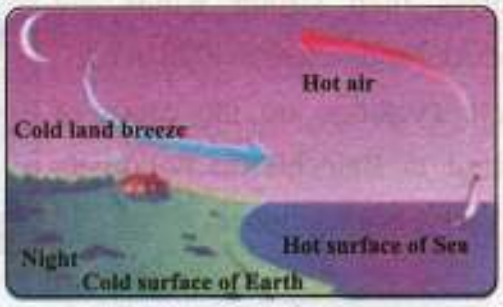
As temperature of sub-continent is low during winter, air pressure increases here. Whereas in this season due to high temperature on Arabian Sea the air pressure is low. Therefore air travels from area of high pressure to area of low pressure. Therefore, they cause no rain. That is why the weather of Pakistan remains dry and cold during winter. In Balochistan, the rain during winter is due to western cyclones. Western cyclones come from Mediterranean sea during winter and cause some rainfall in the western coastal areas.

3. Local Winds

Local winds are specific and limited. Land breeze, sea breeze, valley breeze and mountain breeze are important local winds.

The wind produced due to the difference in day and night temperatures on coastal regions is known as sea breeze and land breeze. The temperature of sea and dry place is not uniform. The surface of sea absorbs and emits heat slowly. During day time, the coastal area becomes hotter than sea and the air above it moves upwards in the form of convectional currents and forms a belt of low air pressure. While the air pressure is high on sea. The cold and humid air travels from sea to dry place. It is known as sea breeze. At night, the wind that travels from dry place to sea is known as land breeze.





Land and sea breezes form due to difference in day and night temperatures. In the same way winds are created in hilly areas due to temperature difference. These are known as valley breeze and mountain breeze. During daytime when

Sun rises, its rays fall on top of mountains and slopes. The air of that place becomes hot and moves upwards in the form of convectional currents. Air pressure decreases. The air inside the valley is cold. It moves upward along the slope of valley and is known as valley breeze. During night due to the emission of heat the air pressure increases and air becomes heavy and moves down towards valley and is known as mountain breeze.

CYCLONE

The whirlpools formed due to low air pressure are known as cyclones. When air moves upward due to heat it produces low air pressure there. Therefore, air moves from areas of high pressure to the areas of low pressure, which makes cyclones.

The centres and surrounding of cyclones have heavy clouds and there are heavy rains. If a sudden change occurs in air pressure of cyclone or distance among isobars reduces then strong winds are produced and severe rainfall occurs. These cyclones are the cause of rainfall in Balochistan. Following are the types of cyclones.

A view of Cyclone

1. Tropical Cyclone

Tropical cyclones are formed on oceans. These are mostly formed between 8-15 degree latitude in North and South of equator. These cyclones are disastrous in nature and destroy the areas in their way. On the south eastern coasts of Pacific

are known as Hurricanes. They are known as Tropical cyclones in Indian ocean where they are formed in Bay of Bengal. These hurricanes leave severe effects on India and Bangladesh. They cause severe loss of lives and material in coastal areas.

2. Temperate Cyclone

Temperate cyclones flow from North to South in 40 to 70 degree latitude. Temperate cyclones usually covers large areas. They blow along western winds.

The main reason of their formation is the collision between cold polar and a bit hot tropical wind. This collision makes a polar front. Eventually hot air moves upward and a cyclone condition happens. Sub-polar low pressure belt is also created due to these cyclones.

3. Tornadoes

Tornado is a small cyclone whose central part consist of a small area. In this central part, winds blow very fast. There are intense black clouds in centre. Tornadoes make disasters in northern America and some parts of Australia. Humidity, dust and other materials add in the central part of tornado and nothing is visible.

A view of a Tornado

MAIN POINTS

- ☆ Barometer is the instrument used to measure air pressure.
- ☆ Millibar, Centimetre and inches etc. are the units to measure air pressure.
- ☆ The average standard air pressure at sea surface is 1013 millibars.
- ☆ The line which represents the air pressure on maps is known as Isobar.
- ☆ The heat prevails throughout the year in the low pressure regions at equator.
- ☆ Permanent or continuous winds blow in the same direction between belts throughout the year.
- ☆ The winds which change the direction with season are known as seasonal winds.
- ☆ Land breeze, sea breeze, valley breeze and mountain breeze are important local winds.
- ☆ The formation of whirlpool due to low air pressure is known as cyclone.
- ☆ Temperate cyclones blow from 40 to 70 degree latitude north and south of equator.
- ☆ Tornadoes are small cyclones whose central part consists of a small area.

EXERCISE

1 Four answers are given for every question. Mark the correct answer.

(i) A small cyclone is known as:

(a) Tropical cyclone (b) Tornado

(c) Temperate cyclone (d) Typhoon

(ii) The air belts are:

(a) 3 (b) 4

(c) 5 (d) 6

(iii) Tropical cyclones are originated in:

(a) Sea (b) Lakes

(c) Dry area (d) Mountains

(iv) In Pakistan, the summer rainfall is due to:

(a) Intense Sun rays (b) Cold winds

(c) Wind storms (d) Monsoon winds

(v) At some place instead of moving along Earth surface, air moves vertically upwards. It is known as air's:

(a) Density (b) Heat

(c) Current (d) Mass

2 Give short answers.

1. Define cyclones.
2. what do you mean by Tornado?
3. What is meaning of Air pressure?

3 Give answers in detail.

1. Explain the air pressure belts on Earth.
2. Explain the types of cyclone.
3. Explain the difference between temperature and air pressure.
4. Explain the wind system.

ACTIVITIES

1. Indicate isobars on a map.
2. Barometer is used to measure air pressure. Write a paragraph.

Chapter
6

ATMOSPHERIC HUMIDITY AND PRECIPITATION

Students Learning Outcomes

After studying this chapter students will be able to:

1. explain Atmospheric Humidity.
2. describe the phenomenon of Condensation.
3. sketch various types of Clouds.
4. explain Precipitation and types of Precipitation.
5. describe the conditions of Precipitation.
6. discuss Precipitation as the source of fresh water and its importance for life over the planet.

HUMIDITY AND CONDENSATION

The presence of water in atmosphere is called as humidity. The quantity of water vapours varies in atmosphere. The water from sea, lakes and rivers continuously enter the atmosphere by the process of evaporation. In atmosphere, this water is in the form of gas.

If the temperature of air is high then the capacity to absorb vapours is also high. If air becomes full of water vapours then at a particular temperature, the process of condensation starts in air. In this process water vapours turn into rain fall. If temperature of atmosphere decreases, its capacity to absorb water vapours also decreases and at a particular temperature, condensation starts in air. Due to cold, the water vapours convert into clouds, rain, snow, hail and dew etc.

TYPES OF CLOUDS

Under specific conditions, the water vapours present in atmosphere gather above sea surface in the form of droplets. The droplets form the clouds. If the same process happens on Earth surface, it is known as fog. As clouds are the combination of water droplets therefore their presence increases the humidity of an area. Humidity means the amount of water vapours present in atmosphere. Clouds cover the Earth surface. The cover of clouds reflects backs the heat waves coming from Earth. It results in the rise in temperature of that area. The presence of clouds during winter increases the temperature of that place. Clouds are divided into different types. Their details are following:

1. Low-Level Clouds

Low level clouds are found about 2000 metres above sea level. They include stratus, stratocumulus and nimbostratus etc.

2. Mid-Level Clouds

Mid-level clouds are found about 2000 to 6000 metres above sea level. Altostratus and altocumulus are included in this type of clouds.

Low-Level Clouds

Mid-Level Clouds

3. High-Level Clouds

These clouds are found about 6000 metres above the surface of sea. Cirrus, Cirro-Stratus and Cirro-cumulus etc. are included in this type of clouds.

4. Vertically Developed Clouds

Vertically Developed Clouds are a special kind of clouds. They tend to expand towards height. Usually the expansion in these clouds is about 1000

Clouds of height

Expanded Clouds

to 12000 meters above sea level. Cumulus and Cumulo-Nimbus are included in this type of clouds.

PRECIPITATION AND ITS TYPES

The fall of water drops on the surface of Earth in liquid or solid form, is known as precipitation. Rain, snow and hailstorm are the types of precipitation. Their detail is following.

1. Rainfall

When air move up from the Earth surface in the form of water vapours, the water vapours gather in the form of clouds. When air moves up more, the temperature of these clouds decreases. The vapours combine together and take the shape of water drops. When these drops become bigger, they fall down as rainfall. The following are the important types of rainfall.

A view of rainfall

(i) Orographic Rainfall

The rain which is because of mountains is known as orographic rainfall. When winds full of water vapours face hindrance of mountains, they move up along slopes and their temperature falls. Vapours turn into drops and rainfall occurs.

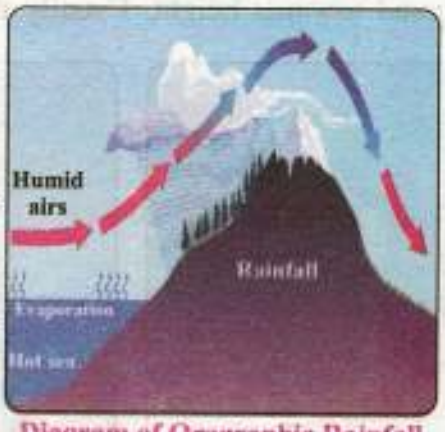


Diagram of Orographic Rainfall

(ii) Convectional Rainfall

The rain due to convectional currents is known as convectional rainfall. In hot areas the air due to more temperature becomes light and where there is more

evaporation, the air rises in the form of convectional currents. As long as air goes upward temperature goes on decreasing and water vapours turn into drops and make cloud. So rainfall occurs.

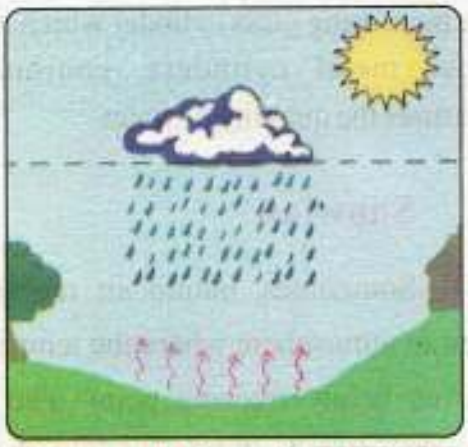


Diagram of Convectional Rainfall

(iii) Cyclonic Rainfall

When air travels from the areas of high pressure to the areas of low pressure then due to the intermingling of hot and cold winds, a cyclone is created. Cyclone is an area of low pressure. Hot air moves upward after getting light in weight. Its temperature decreases gradually and condensation start. Heavy clouds are formed and rainfall occurs.

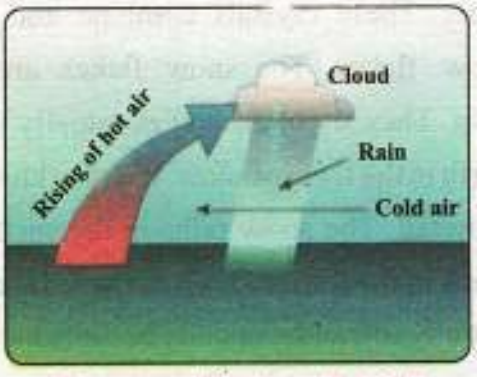
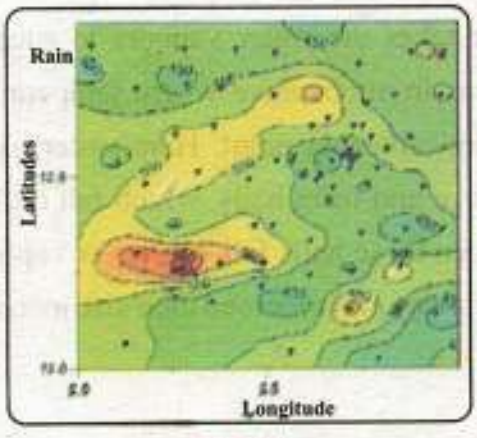


Diagram of Cyclonic Rainfall

Isohyet

The quantity of precipitation is not uniform on the surface of Earth. On maps the quantity of precipitation at different areas is divided by isohyet. These lines are formed by joining the regions having same precipitation rate.



Isohyet

Rain Gauge

The instrument used to measure rain is rain gauge. Rain gauge consists of two metal cylinders and one measuring glass cylinder. A flask is attached with the bigger metal cylinder. Usually small cylinder is inside the big cylinder where the rain water is collected.

The measuring glass cylinder which is fixed under metal cylinders, continuously measures the quantity of water.

Rain guage

2. Snowfall

Sometimes, humid air reaches the point in atmosphere where the temperature is even below freezing point. The water vapours instead of turning into droplets, turn into snow or into frozen crystals of snow. These crystals combine and make snow 'flakes. The snow flakes are very light. They fly in air and eventually fall on Earth in the form of snow. It is also known as snowfall. The snow falls on the surface of Earth in the form of layers. These layers are initially soft and gradually become hard.

A scene of Snowfall

3. Hailing

Air takes the water vapours to such cold areas in atmosphere where temperature is below freezing point. Here water vapours freeze and form hails, which fall on Earth. When these hails fall, the water vapours in their way join them and their size increases.

A view of Hailing

4. Sleet

The combination of rainfall and snowfall is called sleet. When raindrops pass through the lower cold layers of atmosphere they freeze. These drops contain liquid water inside but their outer covering is hard.

PRECIPITATION AS A SOURCE OF FRESH WATER

- ☆ Precipitation is necessary for all kinds of fresh water reservoirs in hilly, plain and desert areas. Precipitation is the source of fresh water storage.
- ☆ The storage of water in reservoirs increases through rain in rivers, streams and lakes.
- ☆ Rain water increases the resources of underground water when it is adsorbed by the earth surface.
- ☆ Water is important component of human, animal and plant life.
- ☆ The life of plants is at the verge of extinction if they are not provided with water.
- ☆ Survival is impossible on Earth without water.
- ☆ Water is profusely used in different types of industries.
- ☆ Water acts as backbone in the field of agriculture.

MAIN POINTS

- ☆ The presence of water in atmosphere is called humidity.
- ☆ Due to cold, water vapours change into cloud, rain, snow, and hail etc.

- ☆ Low level clouds are found about 2000 metres above the sea level.
- ☆ Mid-level clouds are found about 2000 to 6000 metres above the sea level.
- ☆ High-level clouds are found 6000 metres or more above the surface of sea.
- ☆ The fall of water drops on the surface of Earth in liquid or solid form, is known as precipitation.
- ☆ The rain which is because of mountains is known as orographic rainfall.
- ☆ The rain due to convectional waves is known as convectional rainfall.
- ☆ The lines formed by joining the regions having same precipitation rate are known as isohyet.
- ☆ The instrument used to measure rain is rain gauge.
- ☆ The combination of rain and snow is known as sleet.
- ☆ The most important component of human, animals and plant life is water.

EXERCISE

1 Four answers are given for every question. Mark the correct answer.

(i) The height of Stratus from the surface of Earth is:

(a) 1000 metres (b) 2000 metres

(c) 6000 metres (d) 12000 metres

(ii) The lines joining the points having equal quantity of precipitation are:

(a) Longitudes (b) Latitudes

(c) Isobars (d) Isohyets

(iii) Precipitation provides:

(a) Snow (b) Clouds

(c) Humidity (d) Fresh Water Reservoirs

(iv) Orographic Rainfall is on:

(a) Mountains (b) Rivers

(c) Deserts (d) Sea

(v) The instrument to measure rain is:

(a) Anemometer (b) Barometer

(c) Rain Gauge (d) Galvanometer

2 Give short answers.

1. Define precipitation?
2. What is the meaning of Humidity?
3. Define Condensation.
4. Give reasons for snowfall.

3 Give answers in detail.

1. Write down detailed note on types of precipitation.
2. Explain the importance of precipitation.
3. Explain the types of clouds.

ACTIVITIES

1. Write down a paragraph on snowfall by inquiring it from teachers, parents and elders.
2. Make Isohyets on a map by joining the points having the same level of rainfall.

Chapter 7

AGRICULTURE

Students Learning Outcomes

After studying this chapter students will be able to:

1. discuss the importance of Agriculture as an economic activity.
2. describe major types of Farming.
3. describe salient features of irrigated and rain-shed Agriculture in Pakistan and Farming practices in mountainous areas.
4. describe the distribution of Major Crops in Pakistan and the factors of their distribution.
5. analyze major Agricultural problems of Pakistan.
6. describe the Irrigation System of Pakistan and problems associated with Canal Irrigation.

IMPORTANCE OF AGRICULTURE AS AN ECONOMIC ACTIVITY

Cultivation of crops and farming of cattle is called Agriculture, or husbandry. Most of the world population is linked with agricultural sector directly or indirectly. Agricultural sector provides a major part of raw material. Supply of raw material to the industries of the world is also dependent upon agricultural sector. Importance of this sector is described below.

1. Important source of Income

Agricultural sector is the mainstay of world economy. Majority of world population is dependent on agriculture.

2. Source of Food

Agricultural sector provides food for the people of a country, for example grains, fruits, vegetables, milk and meat etc. which fulfill nutritional need of the people.

3. Main Source of National Income

Agricultural sector is the main and most important sector in the economy of many countries. At present this sector is predominant in all productive sectors.

4. Source of Foreign Exchange Earning

Agricultural sector is the biggest source of foreign exchange earnings. All over the world foreign exchange is earned by exporting surplus produce to other countries. In this way foreign exchange earned through agricultural produce plays a prominent role in national income of any country.

5. Supply of Raw Material

Agricultural sector provides raw material to main producing sectors and industries. For example, cotton and yarn is supplied to textile industries,

sugarcane for sugar and seeds for oil. Thus agricultural sector provides firm basis for these industries.

6. Maintenance of Balance of Payment

Agricultural sector is very effective in maintaining the balance of payments. Many countries of the world receive a major part of their income through export of agricultural products which are balanced by import expenditure.

TYPES OF AGRICULTURE

Agriculture is an ancient human profession. It provides employment to many people. Different types of cultivation are described below:

1. Subsistence Agriculture

Subsistence agriculture is self-sufficiency farming in which the farmers focus on growing enough food crops to feed themselves and their families. Most of the fields are small where the use of modern machinery is not possible. This type of agriculture is practiced in South Asia, South-Eastern Asia and China,etc.

A cultivator ploughing the fields

2. Intensive Agriculture

In this type of agriculture better produce is obtained from a small area. By using good fertilizers, water and pesticides on a small piece of land, abundant crop and better financial gains are obtained. This type of agriculture is found mainly in UK, France, Pakistan, India, China, Bangladesh, Indonesia and Egypt etc.

Use of tractor for extensive agriculture

3. Extensive Agriculture

This type of agriculture is practiced in countries where land for cultivation is abundant. In USA, Canada, Russia, Australia and Brazil, etc. the land is more than population, so modern machinery is used for agriculture on a large scale.

4. Commercial Agriculture

This type of agriculture is for commercial purposes. Crops are produced on a large-scale to earn profit. In some parts of Canada, USA, Australia and Argentina etc. commercial agriculture is practiced.

5. Plantation Agriculture

Crops grown on plantations include sugarcane, banana, coconut, spices, and coffee,etc. This type is commonly found in South-East Asia, Africa, America, Malaysia, Indonesia and Sri Lanka. The fields for this agriculture are usually very vast.

6. Truck Farming

Perishable fruits and vegetables are brought to market in trucks, hence the name. Big cities and industrial centers play a crucial role to encourage this type of agriculture, because they have markets. Instant profits are earned by selling the produce. Coastal areas of USA are important centers of truck farming.

7. Mixed Farming

In this type of agriculture crop growing and cattle breeding is done simultaneously. In some regions this type is practiced to meet the local requirements, whereas in other parts it has commercial objectives. Mixed farming is found in USA, Mexico, Brazil, South Africa, Europe and some parts of Asia.

8. Cereal Crops

These crops are cultivated on a large scale to meet local requirements. Main cereal crops of Pakistan include wheat, rice, gram and various lentils.

SALIENT FEATURES OF AGRICULTURE IN PAKISTAN

Irrigated Agriculture

Cultivation of crops by using irrigation system is called irrigated agriculture. In Pakistan, development of agriculture is linked with the advancement and extension of means of irrigation. Climate of the country is hot and dry. Northern and hilly areas of Pakistan receive reasonable rains, but rest of the country is dependent on irrigation for agriculture or farming.

View of an irrigation canal

Presently, 75% of total cultivatable area of Pakistan depends upon irrigation. Canals are most important means of irrigation, while other means include tube wells, Karez system, wells, springs and pools, etc.

Rain-Shed Agriculture

In the areas where underground water is not suitable for cultivation and canal water cannot reach, agriculture is mainly dependent on rain water. This is called rain-shed agriculture.

This type of agriculture is practiced in desert areas, plateaus and mountainous regions. In Pakistan rain-shed agriculture is commonly found in the districts of Muzaffargarh, Layyah, Bhakkar and Bahawalpur, etc. where spiked millet, pearl millet, wheat, maize and mustard are grown in adequate amount.

Mountainous Agriculture

Stepped fields are formed by cutting hill slopes to cultivate crops.

In mountainous regions of Pakistan, both rain-shed and irrigated types of agriculture are practiced. In Swat, Chitral,

A view of Mountainous Agriculture

and Dir etc. water of natural springs is used for irrigation through small water courses. Crops of wheat, maize, fruits and vegetables, etc. are cultivated in mountainous regions.

DISTRIBUTION OF MAJOR CROPS OF PAKISTAN

Major crops of Pakistan are divided into two main seasons: Rabi and Kharif. Rabi crops are sown in winter (October) and harvested in the summer (May), and these include wheat, barley, gram, oil seeds,etc.

In Pakistan food and cash crops are grown. Food crops like rice, wheat, maize, spike and pearl millet etc. cater the food needs of growing population of the country. Crops harvested for the purpose of making profit are called cash crops, like cotton, rice, sugarcane, tobacco etc. These crops are an important source of industrial raw material domestically. Different types of lentils and fruits are also harvested in our country. Pakistan is famous for its fruits. All provinces of Pakistan produce fruits. Important fruits are mango, citrus fruits, grapes, apple, plums, apricot, dates and peach, etc. Fruits in large quantity are also exported to other countries. Major crops of Pakistan are described below:

1. Rice

Rice is an important kharif crop in Pakistan. Hot humid climate, abundant rains and rich soft soil is best suited for this crop. Not only hot climate is necessary at the time of sowing, but water should remain standing in its fields. Extra flooding and abundant rain is favorable for rice crop.

2. Wheat

Wheat is most important Rabi crop of Pakistan. Levelled soil is necessary for it so that watering is easy. Two- third of this crop is grown in canal irrigated areas. Total area under this crop is 5 million hectares. In dry areas other than canal irrigated lands of the country it is grown where winter and summer rains are sure and abundant.

Wheat crop

Multan, Sahiwal, Faisalabad, Sargodha, Muzaffargarh, Jhang, Bahawalpur and Dera Ghazi Khan in Punjab, Sukkur, Hyderabad, Nawabshah and Khairpur in Sindh, Dera Ismail Khan, Peshawar, Bannu, Charsaddah and Mardan in Khyber Pakhtunkhwa, and Naseerabad and Khuzdar in Baluchistan province are important areas for wheat produce.

3. Maize

Maize is used for food and animal fodder. It is an important crop of kharif. Most of the maize is grown in the plains of Peshawar and Mardan in Khyber Pakhtunkhwa, and Sahiwal, Muzaffargarh, Jhang, Bahawalpur, Dera Ghazi Khan and Okara etc. areas in Punjab.

Maize crop

4. Cotton

Pakistan produces 5 percent of the world's total cotton. It is an important cash crop of Pakistan. Land with good drainage facilities is most suitable for its cultivation. At the time of harvest, weather should be

Cotton crop

hot and dry. Three-fourth of the total cultivation area of Pakistan is in Punjab and remaining is in other provinces. Cotton crop also provides raw material for textile and banaspati ghee industries.

Dera Ghazi Khan, Muzaffargarh, Jhang, Bahawalpur, Multan, Sahiwal, Faisalabad in Punjab, Thatta, Badin, Sukkur, Sanghar, Nawabshah, Khairpur and Tharparkar in Sindh province, Dera Ismail Khan and Bannu in Khyber Pakhtunkhwa, and Naseerabad, Jafferabad and Qalat etc. in Baluchistan province are important areas for cotton production.

5. Sugarcane

Sugarcane is another cash crop of kharif. Dry weather and winter is unfavourable for this crop. Sugarcane fields are mostly found in areas with better irrigation system. It is grown in Peshawar and Mardan districts of Khyber Pakhtunkhwa and Punjab plains.

Sugarcane crop

Other than the crops described above, tobacco crop in Pakistan is also a source of raw material for cigarette industry. Barley, Pearl Millet and gram crops are grown in dry, sandy and less fertile lands where irrigation facilities are not specially provided. Pakistan is famous world over for its apple, peach, pomegranate, almond, plum, pear, apricot, orange, lemon and mango produce. Vegetables of best quality, like potato, cauliflower, tomato, onion, green chilli, radish, cucumber, okra, gourd, turnip, brinjal, peas, etc. are also grown in Pakistan.

Fruits

Vegetables

MAJOR AGRICULTURAL PROBLEMS OF PAKISTAN

Our agriculture sector is facing some important problems which are described as under:

1. Cultivators are in financial troubles. Use of better seeds, chemical fertilizers, pesticides, tractor, thresher, harvester and irrigation resources are very difficult for average farmers. Because of illiteracy farmers are not able to learn modern agricultural techniques and prepare plans for better production.

2. Natural disasters like floods, earthquakes, drought, etc. are a source of considerable disturbance for cultivators. These calamities cause great losses to crops.

3. A large part of our farmlands has turned uncultivable because of salinity. Moreover, a lot of arable land is lost due to erosion which results in decrease of cultivable area. Different crop diseases damage or weaken the plants. According to an estimate, this is causing 25% less crop in Pakistan.

4. Because of poor means of transport it is hard to bring our agricultural produce from field to market. Farmers do not have access to markets and wholesalers pay lesser rates which results in their poor financial situation.

5. In spite of canal system, our irrigation resources are inadequate. A lot of water is wasted in channels and fields. A good quantity of water also fall in sea; there are no arrangements in place to store this water.

6. In our country, the use of new seeds, chemical fertilizers and agricultural machinery is also not much in vogue. Less attention is paid towards intensive cultivation on agricultural lands. Institutions for agricultural loans are less in number, so cultivators are usually forced to borrow from wholesalers and moneylenders at high rate of interest. Their exploitation is a source of distress for cultivators.

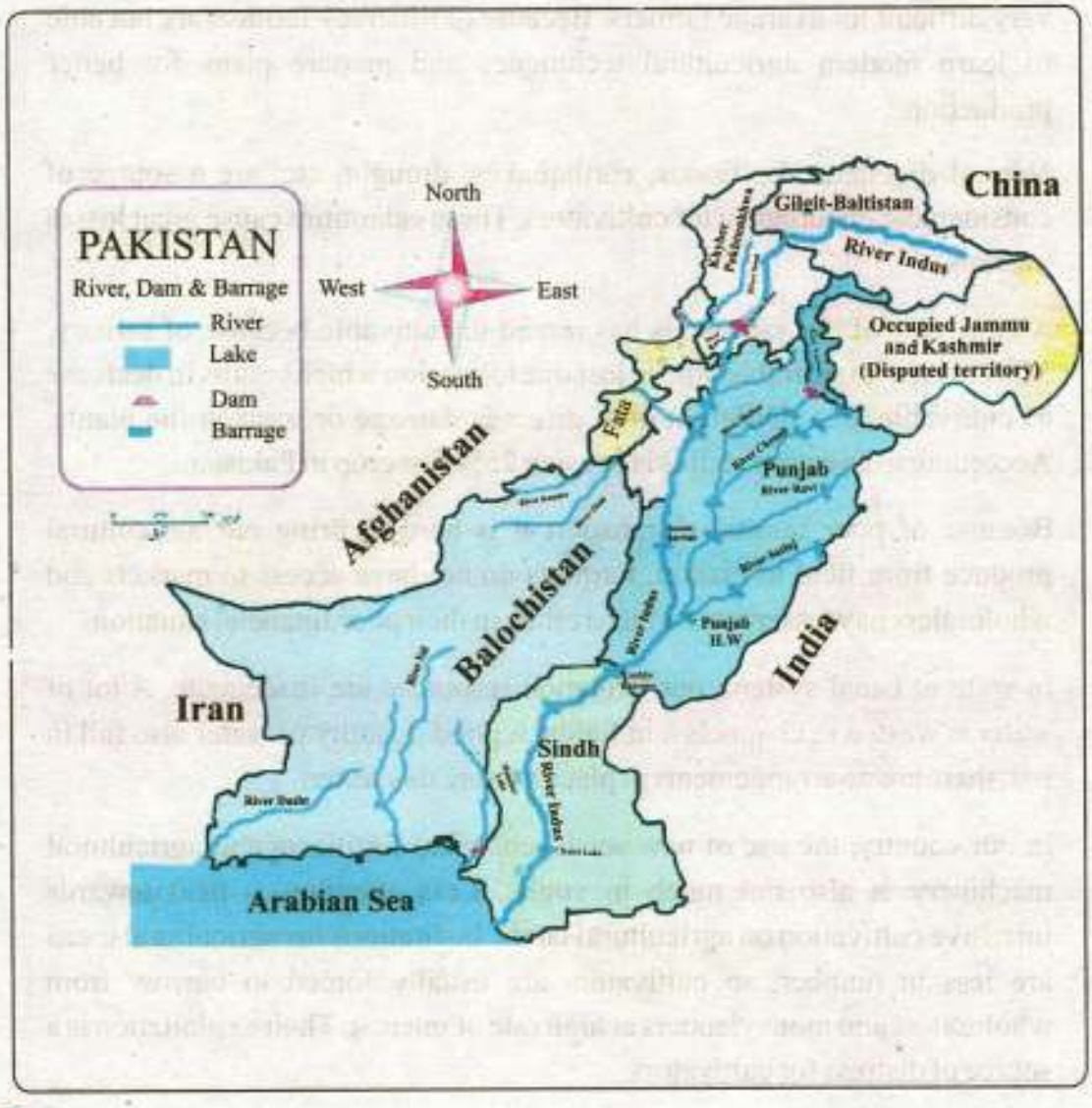
IRRIGATION SYSTEM AND ITS PROBLEMS

Means of Irrigation

In Pakistan the means of irrigation are following:

1. Canals

Canal system of Pakistan consists of dams, barrages and canals. Most of the canals of Pakistan are perennial, and they have water throughout the year.



Others are non-perennial and receive water only in rainy season or summer. In hilly regions when ice melts and level of rivers rises, flood water is channeled into these canals. In winter these canals remain dry. Canals taken from Ravi, Chenab, Jhelum, Sutlej and Indus rivers are important and irrigate different parts of Pakistan. Most of the canals of Pakistan are in Punjab province. Link canals have been dug to transfer water of three western rivers (Indus, Jhelum and Chenab) into two eastern rivers (Ravi and Sutlej). These include Chashma Jhelum, Rasul Qadirabad, Qadirabad Baloki, Baloki Sulemanki, Trimmu Sidhnai, Mailsi Bahawal and Taunsa Panjnad.

Do you know that in 1960, with the cooperation of World Bank an accord of Sindh Basin was signed between India and Pakistan. According to this accord, three rivers of Indus, Jhelum and Chenab were assigned to Pakistan, whereas other three rivers Ravi, Sutlej and Bias were given in control of India.

2. Tube Well

Tube wells are installed in those areas where the level of underground water is very deep. Number of tube wells is increasing day by day. For acquiring water from to this method, a hole is dug and an iron pipe is inserted in the hole. An electric motor or diesel engine is used to pump the water from the depth of hundreds of feet.

Tube-well

3. Karez

Underground water courses are dug which are called Karez.

In Balochistan province, irrigation is done through underground channels. Most of karez are constructed in those areas where water is scarce and evaporation process is rapid.

Karez

4. Wells

Wells are most ancient way of acquiring underground water. In Pakistan wells are dug to install Persian wheel for irrigation where canal water is not accessible.

A scene of a spring

5. Springs

Spring is a natural source where water flows to the surface of the Earth from underground. There are innumerable springs in the mountainous regions of Pakistan. They are most important source of water for local population.

PROBLEMS OF MEANS OF IRRIGATION

1. A great amount of water is absorbed because of unpaved watercourses. Consequently the level of underground water causes logging. Water rises and problem of salinity is caused. Salinity is harmful for crops.
2. We have no proper arrangements to store water. Thus a great amount of water is lost in the sea.
3. Because of silt in unpaved watercourses and delay in silt clearing, water cannot reach the tail ends. This is severely affecting the arable land.
4. Level of underground water is dropping down. Consequently tube-wells are becoming useless.

IMPORTANT POINTS

- ☆ Cultivation of crops and farming of cattle is called Agriculture.
- ☆ In intensive agriculture abundant crop is obtained from a small piece of land.

- ☆ Extensive agriculture is practiced in those countries where land for cultivation is abundant.
- ☆ Crops grown on plantations include sugarcane, banana, coconut, spices, and coffee,etc.
- ☆ In mixed agriculture crop growing and cattle breeding is done simultaneously.
- ☆ System of supplying water for agriculture is called irrigation.
- ☆ Stepped fields are formed by cutting hill slopes to cultivate crops.
- ☆ Maize is used for food and animal fodder purposes.
- ☆ Sugarcane is another cash crop of Kharif which is a main source of sugar.
- ☆ Canal system of Pakistan consists of dams, barrages and canals.
- ☆ Underground watercourses are dug which are called Karez.
- ☆ Wells are most ancient way of acquiring underground water.

EXERCISE

1 Four answers are given for every question. Mark the correct answer.

(i) Pakistan produces percent of total world cotton:

(a) 2% (b) 3%

(c) 4% (d) 5%

(ii) Which crop is used for food and animal fodder purposes?

(a) Wheat (b) Maize

(c) Tobacco (d) Cotton

(iii) Crops are grown in stepped fields in:

(a) Plains (b) Mountain slopes

(c) Desert areas (d) Coastal areas

(iv) In which province of Pakistan Karez are used for irrigation?

(a) Khyber Pakhtunkhwa (b) Sindh

(c) Balochistan (d) Punjab

(v) A natural source from which water flows to the surface of the Earth from underground is called?

(a) Tube-well (b) Karez

(c) Spring (d) Well

2 Give short answers.

(i) What is meant by agriculture?

(ii) Describe karez and spring.

(iii) Name important crops of Pakistan.

(iv) List means of irrigation.

3 Give answers in detail.

(i) Explain why agriculture is important.

(ii) Describe different types of agriculture.

(iii) Describe irrigated agriculture, rain-shed agriculture and mountainous agriculture.

(iv) Analyze the distribution of major crops in Pakistan.

(v) Point out the main agricultural problems in Pakistan.

(vi) Describe the problems of means of irrigation.

ACTIVITIES

1. Facilitate a discussion about the problems of agriculture.
2. Ask the students to prepare a flipchart of crops in their area.

Chapter
8

MINING AND POWER

Students Learning Outcomes

After studying this chapter students will be able to:

1. describe the salient features of Mining as an Extractive Industry.
2. list important conditions for Mining.
3. discuss the role of Minerals and Power Resources in the economy of a country.
4. describe types of Mining.
5. discuss the distribution of major Minerals in Pakistan.
6. describe the Power Resources of Pakistan.

MINING AS AN INDUSTRY

Extraction of valuable minerals and other materials from the earth is called mining. Allah Almighty has bestowed Pakistan with innumerable treasures of minerals like coal, marble, iron, gypsum, etc. Miners explore these hidden treasures from earth which are then used in various industries. Some people in the plateaus of Balochistan and Pothwar are engaged in mining. It is regarded as an industry and an important source of employment and progress of national economy.

IMPORTANT CONDITIONS FOR MINING

To get an access to mineral treasures and mining industry, it is necessary to get the services of mining experts. Miners should be well-trained and best means of transport should be available to send these minerals to industries. Moreover, modern machinery is also important. Thorough digging of mines and adequate financial resources for the extraction of minerals is of utmost importance so that work may continue without any interruption. Industries should be there or new industries should be established to use these minerals as raw material.

ROLE OF MINERALS AND POWER RESOURCES IN THE ECONOMY OF A COUNTRY

In present industrial age, minerals have an essential role in the industrial and economic development of a country. They are important for economic development and affluent society. What is important is to take full advantage of them to steer the national economy towards opulence. Minerals are used in industries as raw materials. Among them iron is of utmost importance. Oil, coal and natural gas provide energy to industries.

TYPES OF MINING

Some types of mining are described below:

1. Hand-Panning Mining

Some time precious metal deposits like gold, etc. are found in alluvial deposits. When deposits are dried up, they are collected in a pan. Then the grains of gold are separated from sand.

2. Shaft Tunnel Mining

It is a method of extracting minerals from great depth. According to this method, a shaft is used to drill vertically, after which mining process is started.

Shaft Tunnel Mining

Hand-panning Mining

3. Adit Tunnel Mining

In this method horizontal passages or tunnels are dug between slopes in hilly areas. Minerals slide down from slopes and gather in tunnels or ditches. Then digging is done in these ditches to extract the minerals. Adit tunnel mining is especially useful in the mining of salt and coal.

Adit Tunnel Mining

4. Open-Pit Mining

This method is used for minerals which are found near the surface. In this method overburden is removed little by little. In Pakistan, open-pit mining method is adopted for the extraction of copper, chromite and limestone, etc.

5. Drilling Mining

This is a method of extracting the minerals from deeper layers by drilling a hole. Pipes are fitted in this hole. Then minerals are brought on surface through pipes. This method is in use for oil and gas.

Open-pit Mining

Drilling Mining

DISTRIBUTION OF MAJOR MINERALS IN PAKISTAN

In Pakistan, minerals are categorized in two groups: metal and non-metal. Metal minerals include iron, copper and chromite , etc. whereas non-metal minerals are cooking salt, limestone, marble, gypsum, china clay, etc. Major minerals of Pakistan are described below:

1. Mineral Oil

Mineral oil and its products have now gained dominating economic importance. Major products of mineral oil include gasoline, kerosene oil, mobil oil, wax, coal tar, etc. In 1961 after the establishment of Oil and Gas Development Corporation Limited (OGDCL) in Pakistan, oil exploration process got an impetus. Pothohar Plateau in Pakistan is an ancient area for the production of mineral oil where oil wells are located in Balksar, Khor, Dhallian,

Joyamir, Manwal, Tut, Kot Sarang, Mial, Aadhi and Qazian. In lower Sindh, important areas for oil production are Khaskheli, Kunar, Tando Allahyar and Zamzama. These reserves are playing an important role in catering domestic oil demand. Mineral oil is used after refining.

2. Natural Gas

Natural Gas is a cheap source of energy. In Pakistan natural gas was discovered at Sui in Sibbi, Baluchistan in 1952. That is why in Pakistan it is usually called Sui Gas. These reserves of natural gas are among the biggest reserves of the world. This gas is used for commercial as well as for domestic purposes. Gas has been discovered in Uch and Zan in Baluchistan, Khairpur, Mazrani, Sari, Hundi, Kandkot and Sarang in Sindh. Reserves of natural gas in Dhodak, Pirkoh. Dhallian and Mial are in Punjab.

An Oil Refinery

3. Copper

In ancient times, copper was used only for coins, utensils, etc. Now it is being used for electric cables,etc. in Pakistan. In Baluchistan, reserves of copper discovered and explored in Chaghi, Sandak, Qalat, Zhob and some other places are very important. In Khyber Pakhtunkhawa, copper reserves are in Dir, Chitral and Hazara.

4. Coal

In Pakistan coal is used for thermal power production, brick kilns and domestic needs. At present, coal is being mined in Baluchistan from Khost, Sharag, Digari, Sherin, Aab, Macch, Bolan and Harnai. In Punjab

Coal

coal mining areas are Dandot, Paddh and Makarwal. In Sindh province coal mines are located in Thar, Jamper, Sarang and Lakhra. In Khyber Pakhtunkhwa province, coal reserves are in Hangu. Coal is one of most important source of energy.

5. Iron Ore

Production of iron ore in Pakistan was started in 1957. Explored reserves of iron are approximately more than 450 million tons. Major Iron ore reserves sites in Pakistan include Kalabagh (district Mianwali), Domal Nisar (district Chitral), Langrial and Chilghazi (district Chaghi) which are important for iron ore production.

6. Rock Salt

Salt rock is used in chemical industry as well as cooking. Extensive reserves of salt in Pakistan are in Khewra, district Jhelum. Other reserves are in Kalabagh (district Mianwali), Warcha (district Khushab) and Bahadurkhail (district Karak). Salt is also mined from Lasbela, Makran (near coast in Baluchistan) and Maripur (Karachi).

Salt

7. Chromite

There are more than 25 big reserves of chromite in Pakistan. It is exported to different countries and also used in Karachi Steel Mills. Chromite reserves in Baluchistan province has been found in Muslim Bagh, Chaghi and Kharan areas. Some reserves were also found in Malakand and Mohmand Agency areas of Khyber Pakhtunkhwa province. Chromite is an important metal which is mainly used in steel industry.

8. Gypsum

Gypsum is used as raw material in phosphate fertilizer. It is also important for cement, paper, plaster of Paris, Sulphuric acid, paints and rubber industries. Most of gypsum in Pakistan is found in salt range areas of Khewra, Dandot, Daudkhel and Qadirabad. There are also some mines of gypsum in Rohri, Kohat, Dera Ghazi Khan, Lora Lai and Sibbi. Pakistan is endowed with vast reserves of gypsum which are approximately more than 350 million tons.

9. Lime Stone

Limestone is an extremely useful mineral. It is used in glass, soap, steel, bleaching powder industries for whitewash, paints, chewing betel, lime and soda ash. Most of limestone in Pakistan is found in northern and western hilly areas. Its reserves are in Daudkhel, Wah, Rohri, Hyderabad, Sibbi, Dera Ghazi Khan, Kohat, Noshehra and Khuzdar.

10. Marble

Marble of different types and colors is found in Pakistan. It is used for the surfacing of floors and walls of buildings. Marble producing areas include Mardan, Swat, Noshehra, Hazara, Chaghi, Gilgit and District Muzaffarabad (Azad Kashmir). Moreover, black and white marble in great quantity has been discovered in Kala Chitta range of Attock.

Marble

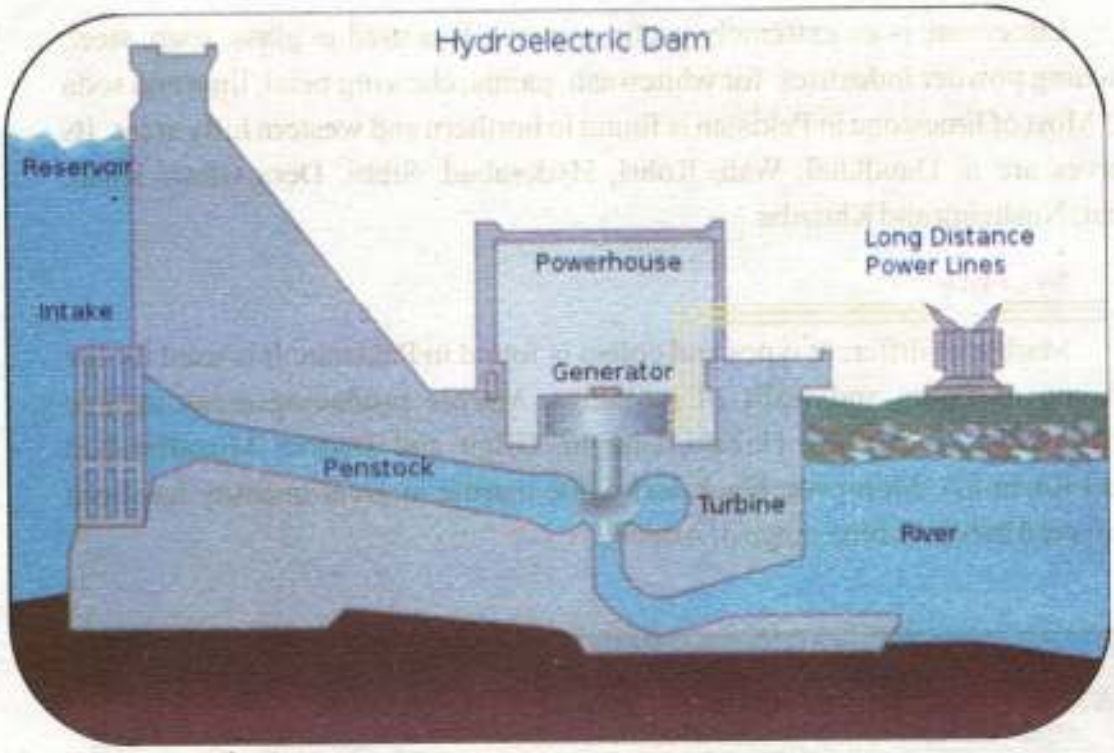
POWER RESOURCES OF PAKISTAN

1. Electricity

Electricity generating resources in Pakistan are as under:

(i) Hydro Power

Northern and **north-western** hilly regions are very important for hydro electricity where natural environment is suitable for dams. In plains waters of rivers and canals are used to produce hydro power.



Tarbela dam on river Indus is the largest hydro-electric power project, whereas Ghazi Barotha is second and Mangala dam on river Jhelum is third largest. Warsak dam is constructed on river Kabul. Chashma hydro-electric plant, Malakand, Dargai hydropower project and Rasul hydropower plant,etc. are other important hydro electricity projects. This is the cheapest electricity generating source.

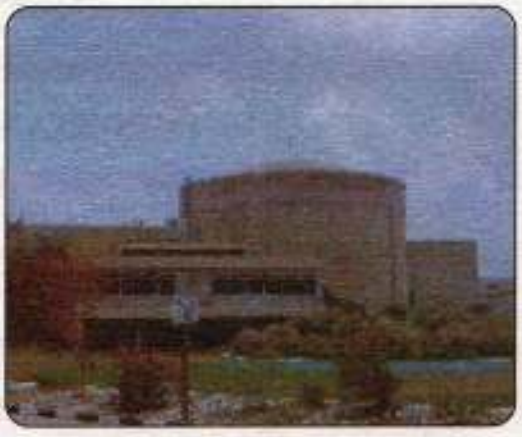
(ii) Thermal-Electric Power

In Pakistan, thermal power plants are running with gas, oil and coal. Thermal power production units are operational in Karachi, Lahore, Multan, Faisalabad, Guddu, Jam Shoro, Muzaffargarh, Sakkhur, Larkana, Kotri, Pasni, Gilgit and Kot Addu. To cater the future needs of electric power in Pakistan many projects are in place and other are in progress.

(iii) Nuclear Power

Pakistan Atomic Energy Commission (PAEC) is responsible for the planning, installation and operation of nuclear power plants in the country. At present time, atomic energy is playing an important role in catering the needs of energy throughout the world.

Karachi Nuclear Power Plant (KANUPP) is the first such plant in Pakistan. Two more atomic energy plants have been installed near Chashma town of district Mianwali: Chashma Nuclear Power Plant I and Chashma Nuclear Power Plant II.



A view of Karachi Nuclear Power Plant

(iv) Solar Power

Energy extracted from sunlight is called solar power which is being used for electric power generation. At present,solar power is being utilized in Pakistan on a very small scale, for example running small machinery and motors. Soon the solar energy will be the main source of energy all over the world because other sources of energy are expensive and hard to access.

(v) Wind Energy

Use of winds for power generation is called wind-electric power. In Pakistan plans are being implemented to generate electric power with the help of

wind. Windmill consists of three or four blade fans fixed on high poles. These fans are called turbines. Wind moves these fans and their energy is converted to electric power.

Windmill Turbines

IMPORTANT POINTS

- ☆ Extraction of valuable minerals and other materials from the earth is called mining.
- ☆ Shaft-Tunnel method is used for extracting minerals from great depth.
- ☆ Major products of mineral oil include gasoline, kerosene oil, mobil oil, wax, coal tar, etc.
- ☆ In Pakistan natural gas was discovered at Sui in Sibbi, Baluchistan.
- ☆ In Pakistan coal is used for thermal power production, brick kilns and domestic needs.
- ☆ Production of iron ore in Pakistan was started in 1957.
- ☆ There are more than 25 vast reserves of chromite in Pakistan.

- ☆ Gypsum is used as raw material in phosphate fertilizer.
- ☆ Northern and north western hilly regions are very important for hydro electricity.
- ☆ Pakistan Atomic Energy Commission (PAEC) is responsible for the planning, installation and operation of nuclear power plants in the country.
- ☆ Energy extracted from sunlight is called solar power.
- ☆ Use of winds for power generation is called wind-electric power.

EXERCISE

1 Four answers are given for every question. Mark the correct answer.

(i) First atomic plant of Pakistan was installed at:

(a) Chashma (b) Lahore
(c) Islamabad (d) Karachi

(ii) Reserves of which mineral in Pakistan are approximately more than 185 million ton?

(a) Coal (b) Salt
(c) Gypsum (d) Iron

(iii) Extraction of valuable minerals and other materials from the earth is called:

(a) Mining (b) Earth Crust
(c) Agriculture (d) Geography

(iv) Biggest natural gas reserves in Pakistan are located in the province of:

(a) Khyber Pakhtunkhwa (b) Sindh

(c) Baluchistan (d) Punjab

(v) In Pakistan, Oil and Gas Development Corporation Limited (OGDCL) was established in:

(a) 1961 (b) 1971

(c) 1973 (d) 1975

2 Give short answers.

(i) Write the names of five non-metal minerals.

(ii) How wind-electricity is generated?

(iii) Define mining.

3 Give answers in detail.

(i) Mention ten minerals and their use, Also point out where the reserves of those minerals are located.

(ii) Point out necessary conditions for mining.

(iii) Explain the role of minerals and power resources in the economy of a country.

(iv) Describe the different types of mining.

ACTIVITIES

1. List down different minerals on a flipchart and place it on the wall of your classroom.
2. Divide the class in three groups and assign each of them the topics of coal, petroleum and natural gas. Then ask them to discuss the usefulness and reserves of power resources.

Chapter
9

INDUSTRY

Students Learning Outcomes

After studying this chapter students will be able to:

1. discus the factors that affect the Location of Industry at a place.
2. enumerate different types of Industries.
3. describe Textile, Sugar, Cement and Automobile Industries of Pakistan with refercnce to their importance, locational factors, distribution and major problems.
4. describe the Cottage Industry.
5. enquire about the Cottage Industry of Pakistan.

THE FACTORS FOR LOCATION OF AN INDUSTRY

Industry is a place where investor provides different raw materials and natural resources to produce different items. To promote the industry of a country man power and capital is required.

The factors that influence the location of industries are described below:

1. Raw Material

Usually industry is located at such a place where raw materials are easily and abundantly accessible. For example, textile industry will be located near such places where cotton is sown on a large scale.

2. Manpower

Adequate supply of labour is necessary for any industry. Both skilled and unskilled labourers are employed in industries. Cheap and skilled labour is required for industry. So industries are mostly located in thickly populated areas, to provide employment to local people.

3. Capital

Abundant capital is required for the setting up of an industry. Capital is necessary for the construction of building, installation of machinery and to meet other expenses. This capital is acquired from local and foreign investors as well as foreign countries.

4. Energy

Energy is necessary to run heavy machinery in the industries. Coal, natural gas, oil and electricity are the chief sources of energy. The type of machinery in industry determines the nature of required energy.

5. Means of Transportation and Communication

Industries are located in such areas where means of transport and communication are better. Facility of good roads and railways is directly connected with industrial development. These means are used to bring raw materials to industrial areas and send finished products to markets. So, better means of transportation and communication between industrial and concerned areas are important.

6. Market

Generally industries are located in close proximity to markets, because finished products are immediately sent to markets to earn profits.

7. Government Policies

Policy of Government considerably affects the location of industrial units. Political stability in the country provides continuity to government policies which is beneficial for industrial development.

DIFFERENT TYPES OF INDUSTRIES

There are three basic types of industries:

1. Cottage industry
2. Small industry
3. Heavy industry.

1. Cottage Industry

Cottage industry is such an industry which is established locally. Artisans produce different articles by using their tools and their products in the markets. Woodwork, production of small iron tools, mat weaving, preparation of household articles with leaves and willow branches and earthen wares,etc. are included in the cottage industry.

2. Small Industry

It is such an industry which is dependent on locally available raw materials. Most of the people in Pakistan are connected with small industry. Our small industry includes: furniture industry, dairy farming, honey collection industry, carpet weaving, sports ware, printing industry, marble articles, paper industry, chemical industry (paint, etc.) and shoe making industry, etc.

3. Heavy Industry

Heavy industries are those which are engaged in the large-scale manufacture of capital goods for other industries and consumers. Vast capital resources are required to run heavy industries. Major heavy industries of Pakistan include: textiles, sugar, cement, automobile (jeeps, cars, tractors, motorbikes manufacturing), electronic devices (television, refrigerator, and air- conditioner), chemical fertilizers and leather industries.

MAJOR INDUSTRIES OF PAKISTAN AND THEIR IMPORTANCE

Main industries of Pakistan are textiles, sugar, cement and automobiles, which are described below:

1. Textile Industry

Textile industry is playing most important role in the economy of Pakistan. This is largest industry of Pakistan and a dominant contributor in foreign exchange earnings. This industry also has a big share in Pakistan's exports. It is providing employment to a large number of workers in our country. In textile industry (cotton) different machines are used for ginning, spinning and weaving.

Textile Industry

Investors of Faisalabad, Karachi and Hyderabad invested a vast amount of capital in local textile industries and thus contributed in the development of textiles. Other than these three centers, there are many areas in all four provinces where cotton cloth weaving mills are located.

2. Sugar Industry

At the time of independence in 1947 there were only two sugar mills in Pakistan. According to 2011-12 statistics, now this number has increased to 79. Sugars mills are located in sugarcane producing areas of the country. Sugar mills are located in Larkana, Pattoki, Kamalia, Jhang, Mandi Bahauddin, Bhakkar, Joharabad, Layyah, Mardan, Charsaddah, Noshehra, etc.

Sugar Industry

3. Cement Industry

Limestone and gypsum are necessary for cement industry. Reserves of these raw materials are abundant in Pakistan. Because of the speedy trend in construction work, demand of cement is rising fast. In our country cement factories are located in district Dera Ghazi Khan, Rawalpindi, Karachi, Jhelum, Thatta, Hyderabad, Mianwali, Hazara and Khairpur, etc.

Cement Industry

4. Automobile Industry

In this sector many big units are engaged in the production (manufacturing and assembling) of vehicles. Hundreds of other manufacturing units supply parts

to this sector. Volume of vehicle manufacturing is rising because of national demand. This sector manufactures cars, trucks, buses, jeeps, tractors, motorbikes, etc. Automobile manufacturing units are located in Karachi, Hyderabad, Lahore, Gujranwala, Gujrat, etc.

Automobile Industry

MAJOR PROBLEMS OF INDUSTRY

- Our Industry is facing many problems. Cost of production is too high in Pakistan. The main reason is that our manufacturers are ignorant of modern research. Consequently they are not able to utilize their full potential.
- Because of low income levels in Pakistan, savings are too low. Resultantly, adequate capital is not available which is essential for any industry.
- Shortage of skilled labour in our country is a problem for investors.
- Export-based industry is less profitable now. Moreover, we have a limited access to international markets.
- Imported industrial machinery is very costly. Because of shortage of capital, acquisition of advanced technology is also hard. Many factories are running with old machinery.
- Pakistan is facing crisis because of shortage of energy and power resources.

IMPORTANT POINTS

- Industry is a place where investor provides different raw materials and natural resources to produce different items.
- Both skilled and unskilled labourers are employed in industries.
- Energy is necessary to run heavy machinery in the industries. Coal, natural gas, oil and electricity are the chief sources of energy.
- Generally industries are located in close proximity to markets.
- Political stability in the country provides continuity to government policies which is beneficial for industrial development.
- Cottage industry is such an industry which is established locally.
- Small industry is dependent on locally available raw materials.
- Heavy industries are those which are engaged in the large-scale manufacture of capital goods for other industries and consumers.
- Textile industry is playing most important role in the economy of Pakistan.
- Sugars mills are located in sugarcane producing areas of the country.

EXERCISE

1 Four answers are given for every question. Mark the correct answer.

(I) At the time of independence, there were sugar mills in Pakistan:

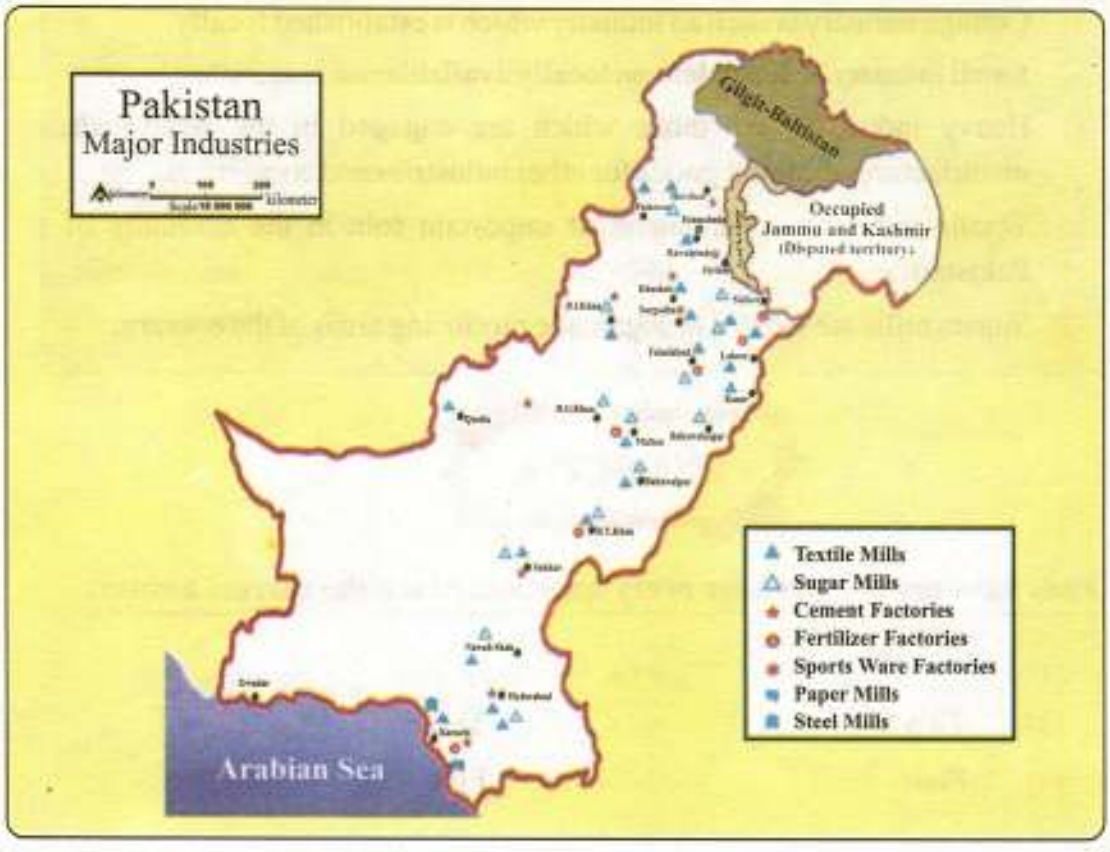
(a) Two (b) Three

(c) Four (d) Five

COTTAGE INDUSTRY OF PAKISTAN

Cottage industry is considered significant for the economic development of Pakistan. These industries produce goods and raw materials locally to meet our maximum necessities. They also introduce new goods into market and shape our ways of life. Our cottage industry includes mainly those goods which are produced by local craftsmen by using traditional and new methods with the help of simple tools. These goods are manufactured from local raw materials and mostly consumed locally.

Cottage industry of Pakistan is dominated by embroidery, spinning, hand woven cotton and woolen textiles, hemp products, gold and silver jewelry, leather goods, metal ware, cutlery, earthenware, sports goods, woodwork, handmade carpets and rugs, utensils, toys, etc.



(ii) Which industry has the biggest share in Pakistan's exports?

(a) Automobile (b) Sugar

(c) Textile (d) Cement

(iii) Important centre of textiles in Pakistan is:

(a) Lahore (b) Faisalabad

(c) Islamabad (d) Peshawar

(iv) What is necessary for cement industry:

(a) Chromite and Sulphur (b) Fireclay and Iron

(c) Limestone and Gypsum (d) Rock Salt and China Clay

(v) According to 2011-12 statistics, total number of sugar mills in Pakistan has increased to:

(a) 85 (b) 79

(c) 99 (d) 108

2 Give short answers.

(i) Define an industry.

(ii) Name five heavy industries.

(iii) Name ten cottage industries of Pakistan.

3 Give answers in detail.

(I) Describe the factors for locating an industry.

(ii) Describe the textiles, sugar, cement and automobile industries of Pakistan.

(iii) Point out the problems of industry.

ACTIVITIES

1. List down ten cottage industries found in their surroundings on a flipchart.
2. Ask your teacher, parents or elders about the process of producing sugar, and write a paragraph about it.

Chapter
10

TRADE

Students Learning Outcomes

After studying this chapter students will be able to:

1. enlist and discuss different types of Trade.
2. analyze major factors that affect International Trade.
3. identify International Trade Partners of Pakistan with reference to its major items of Exports and Imports.

TYPES OF TRADE

1. Domestic Trade

Exchange of goods and services within the boundaries of a country is called domestic trade. All the partners involved in this exchange of goods and services belong to same country.

2. International Trade

The exchange of capital, goods, and services across international borders or territories is called international trade. Under this trade goods and services are exchanged between two or more countries. Sellers and buyers belong to different countries. For example, Pakistan imports different types of machinery, devices and raw material to promote its industrial sector. In the same way, many countries of the world import agricultural produce from Pakistan because our country is self sufficient in many agricultural products.

MAJOR FACTORS THAT AFFECT INTERNATIONAL TRADE

Availability or scarcity of resources affects the international trade. Major factors influencing the international trade are described below:

1. Markets

Every country is always in search of new markets to sells its goods and earn foreign exchange. This is the age of competition. Any country can get attention by manufacturing quality goods.

2. Means of Transportation

Dependable and fast means of transportation are essential for international trade. Most of the international trade is carried through sea routes. Countries located near seas enjoy comparatively low cost and easy foreign trade. Countries located away from seas are forced to import and export good through some other country. Neighbouring countries can trade with each other easily for which trucks and railways are suitable means of transportation.

3. Population

Population is also one of the factors influencing international trade. A country with less population is able to export surplus products. Usually more

populous countries have a higher volume of trade. Special skills of people are also a contributing factor in a country's trade. Moreover, natural dispositions of people also contribute significantly in international trade.

4. Quota System and Government Policies

Quota system is imposed to balance the international trade. Different countries can trade according to their trade quota. Domestic political situation and government policies also affect the international trade.

MAJOR EXPORTS OF PAKISTAN

Pakistan is essentially an agricultural country. A large portion of our exports consist of agricultural raw materials. Now because of better official policy our products are also contributing to export volume. Partner countries in international trade are considered friends of Pakistan. Major exports of Pakistan are as under:

1. Cotton

Cotton is the backbone of Pakistani economy. A considerable part of foreign exchange is earned through the export of cotton. Japan, China, Singapore and Italy, etc. are major buyers of Pakistani cotton.

Cotton

2. Rice

Second biggest export item of Pakistan is rice, which is causing a continuous increase in foreign exchange. Quality of Pakistani rice is also better. Presently Dubai, Saudi Arabia, Kuwait, Turkey, Sri Lanka and Iran, etc. are main importers of rice from Pakistan.

Rice

3. Cotton Yarn and Cotton Cloth

Cotton yarn is another important export item of Pakistan. Foreign exchange earned by its export is rapidly rising with increase in cotton production. Major importers of Pakistani cotton yarn include Japan, China, Germany, and Hong Kong, etc.

Cotton Yarn

Cotton Cloth

Cotton cloth is an important part of exports from Pakistan, and our cotton cloth enjoys a great demand all over the world. Major buyers of Pakistani cotton include UK, USA, Russia and Iran, etc.

4. Carpets

Pakistani carpets are most favourite because of their high quality and exquisite designs. They are an important source of profit for exporters and bring ample foreign exchange to the country. Carpets of Pakistan are exported to Germany, France, USA, UK, Italy,etc.

Carpet

5. Leather and its Products

Leather and its products from Pakistan are rapidly gaining worldwide demand. Leather products of best quality, e.g. handbags, purses, belts, jackets, etc.

are exported to Italy, Japan, Russia, China, etc. These exports are a source of plentiful foreign exchange.

Jacket

Handbag

6. Miscellaneous Exports

Besides above mentioned export goods, Pakistan is exporting many products to other countries, like fruits, fish, surgical equipments, readymade garments, hosiery, towels, sports goods, shoes, etc. These exports bring plentiful foreign exchange for the country.

Towels

Bats

Shoes

MAJOR IMPORTS OF PAKISTAN

Main imports of Pakistan are described below:

1. Petroleum and its Products

Petroleum Products

Production of petroleum in Pakistan is not sufficient. So a large amount of foreign exchange is spent for the import of petroleum and its products. Petroleum and its products have a direct influence on manufacturing sectors of the country. Rise of oil prices in the international market cause a significant increase in the prices of goods in the country. This also results in decreasing the foreign exchange reserves. Pakistan imports petrol, diesel and petroleum products like Vaseline and plastic from Saudi Arabia, Kuwait, Abu Dhabi, Iran, Iraq, etc. to meet domestic demands.

2. Tea and Edible Oil

Pakistan imports edible oil mostly from USA, Sri Lanka and Malaysia. Consumption of tea is high in Pakistan. Most of tea is imported from Bangladesh and Sri Lanka which costs a lot of foreign exchange.


Edible Oil

Tea

3. Machinery and Raw Material

Pakistan is forced to import machinery and raw material for the development of different industrial sectors. Without these exports our industry cannot prosper. So import of foreign machinery and raw material is a necessary for economic development.

Textile Machinery

4. Iron, Steel and its Products

Pakistan is endowed with vast reserves of iron. Although Karachi steel mill is working but it is unable to meet domestic demands. Consequently a large quantity of iron, steel and its products are to be imported from foreign countries. To meet domestic demand and to run factories iron, steel and its products are imported from Germany, Belgium, UK, France, USA, Japan and Australia.

Iron Pipes

5. Chemical Fertilizers

Pakistan is an agricultural country. Chemical fertilizers play an important role in the development of agricultural sector. Most of fertilizers are being produced in Pakistan to meet domestic requirements, but increasing demand makes it necessary to import specific chemical fertilizers from other countries. Some kinds of fertilizers are imported from Iraq, Tunis, Italy and USA.

Chemical Fertilizer

6. Miscellaneous Imports

Besides above mentioned import items, different other goods are also imported from foreign countries to meet domestic demands. These includes: medicines, paints, electric appliances, paper and stationary, etc. Import of these goods costs a lot of foreign exchange.

Miscellaneous items of import

BALANCE OF TRADE

Difference in value over a period of time between a nation's imports and exports of visible goods and services is called balance of trade. It implies that part of a nation's payments which are related to the export and import of visible goods.

IMPORTANT POINTS

- ☆ Exchange of goods and services within the boundaries of a country is called domestic trade.
- ☆ The exchange of capital, goods, and services across international borders or territories is called international trade.
- ☆ Most of the international trade is carried through sea routes.
- ☆ A large portion of Pakistan's exports consist of agricultural raw materials.
- ☆ Cotton is the backbone of Pakistani economy.

- ☆ Pakistan earns foreign exchange by the export of cotton yarn.
- ☆ Production of petroleum in Pakistan is not sufficient. So a large amount of foreign exchange is spent for the import of petroleum and its products.
- ☆ Pakistan is forced to import machinery and raw material for the development of different industrial sectors.
- ☆ Chemical fertilizers play an important role in the development of agricultural sector.
- ☆ Difference in value over a period of time between a nation's imports and exports of visible goods and services is called balance of trade.

EXERCISE

1 Four answers are given for every question. Mark the correct answer.

(i) Reason of trade between different countries is:

(a) Location of Industries
(b) Increase and decrease of resources
(c) Economic development
(d) Production enhancement

(ii) The exchange of capital, goods, and services across international borders is called:

(a) International trade (b) Balance of payment
(c) Balance of trade (d) Domestic trade

(iii) Import of which item is high in Pakistan?

(a) Paper (b) Paint
(c) Petroleum (d) Silk

(iv) Pakistan imports most of tea from Bangladesh and

(a) UK (b) Iran

(c) Sri Lanka (d) USA

(v) Which crop is the backbone of Pakistani economy?

(a) Wheat (b) Cotton

(c) Sugarcane (d) Rice

2 Give short answers.

(i) What is meant by domestic and international trade?

(ii) Write the name of three major imports and exports of Pakistan.

(iii) Define balance of trade.

3 Give answers in detail.

(i) Describe major factors that affect international trade.

(ii) Describe the major exports of Pakistan.

(iii) Describe the major imports of Pakistan.

ACTIVITIES

1. List down major imports and exports of Pakistan on a flipchart.
2. Arrange a discussion among the students about: "what are the effects of importing more and exporting less."

Chapter
11

TRANSPORTATION

Students Learning Outcomes

After studying this chapter students will be able to:

1. discuss modes of Transportation (Rail, Road, Water and Air) and their characteristics.
2. describe Road, Railway, Air and Water Transport Network of Pakistan.
3. discuss the social, economic and geographical importance of Transportation Network.

TYPES OF TRANSPORTATION

Means of transportation play an important role in the development of a country. These means are helpful in transporting people and goods from one to

Road

Train

another place. Inexpensive and fast means of transportation are must for the development of a country. Since ancient times man has adopted different modes of transportation, like horses, camels, ponies, oxen, elephants, etc. Means of transportation evolved continuously after the invention of wheel. Now there are very fast means available throughout the world. Prosperity and development of a country depends upon fast and advanced means of transportation.

Sea Routes (Ships)

Air Routes (Aeroplane)

Different means of transportation are adopted in various parts of the world according to physical, economic and local needs. There are four means of transportation: Road, Railway, sea route and air route.

TRANSPORT NETWORK OF PAKISTAN

Transport network of Pakistan is described below:

1. Road

Means of transportation in Pakistan evolved greatly with the passage of time. There is a vast network of roads in the country which connects far flung areas. Road transportation in Pakistan is cheaper and more popular. In rural areas motorbikes, carts, tongas, etc. whereas in urban areas buses, trucks, wagons, cars, etc. are generally used.

In the plains of Pakistan there are more roads because of easiness of construction. In the provinces of Baluchistan and Khyber Pakhtunkhwa, there are fewer roads because of hilly and rugged area. Most of roads are constructed by cutting the hills.

National highways and motorways are most important metal roads in Pakistan. Management of highways is under federal government who controls them through National Highway Authority. Besides these, there are provincial departments for the monitoring and repairs of highways. Likewise there are highway departments at division and district levels. Union councils and tehsil councils are responsible for the maintenance of small roads. These all departments are responsible for the construction and maintenance of roads, framing of traffic law and prevention of road accidents. Total length of metal road in Pakistan is about 2,60,000 kilometers. Major highways of Pakistan are as under, which connect different cities.

1. G.T. Road	Peshawar, Lahore, Multan, Sukkur, Hyderabad, Karachi.
2. Indus Highway	Peshawar, Dera Ismail Khan, Dera Ghazi Khan, Kashmore, Larkana, Sehwan Sharif, Karachi
3. Super Highway	Karachi, Ormara, Gawadar, Pasni, Jiwani
4. Coastal Highway	Karachi, Hyderabad
5. Silk Road is also important which connects Pakistan and China.	

A network of motorways is being established to meet the requirements of advanced age. According to this project, M1 (Peshawar to Islamabad), M2 (Islamabad to Lahore) and M3 (Pindi Bhattian to Faisalabad) have been completed, while other projects are under progress. Vehicles are able to travel unhindered at a specific speed on motorway.

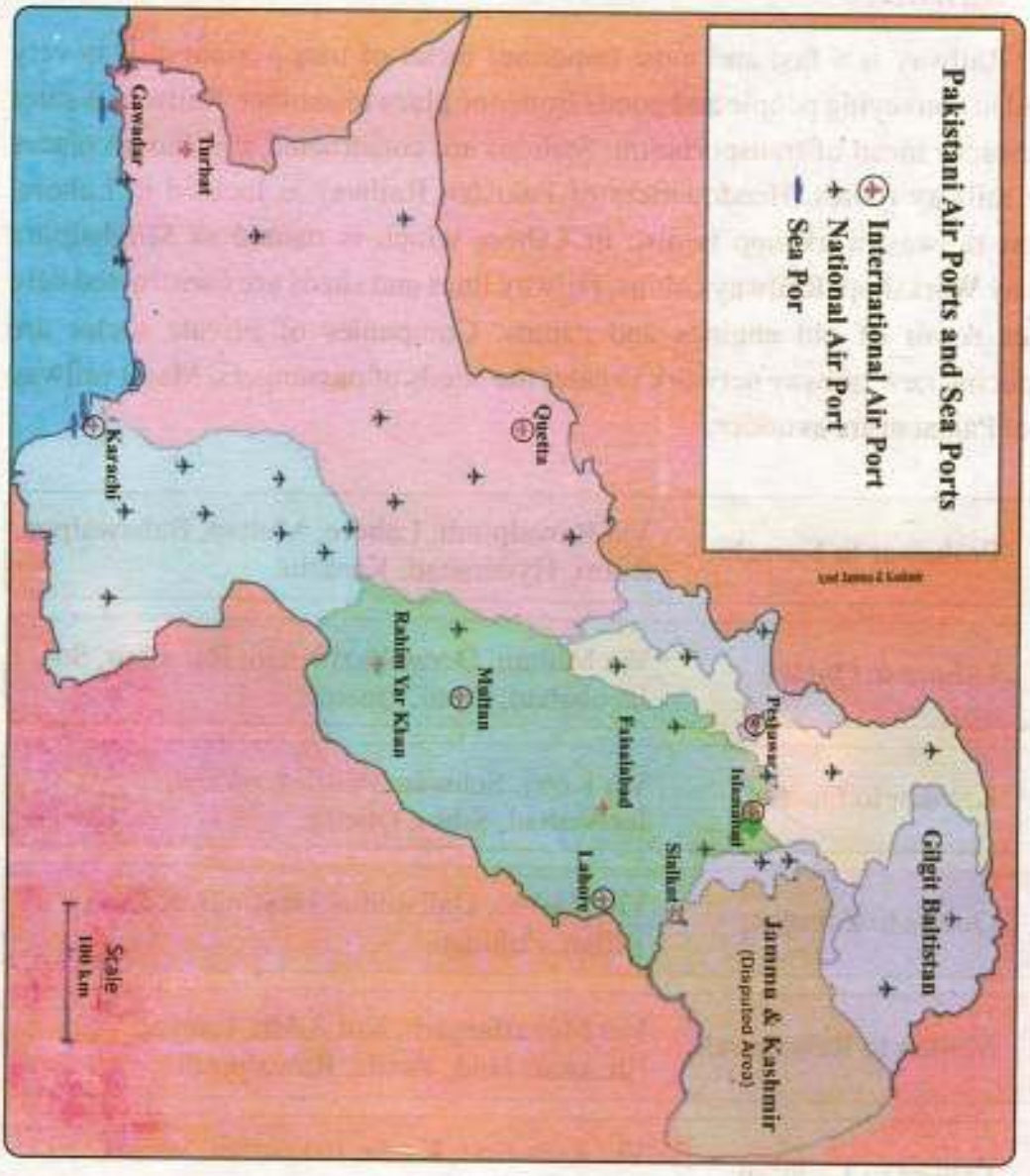
2. Railway

Railway is a fast and most important mean of transportation. It is very helpful in conveying people and goods from one place to another. Railway is safer and cheaper mean of transportation. Stations are constructed at different places along railway routes. Headquarters of Pakistan Railway is located in Lahore. Largest railway workshop is also in Lahore which is named as Mughalpura Railway Workshop. Railway cabins, railway lines and sheds are constructed here besides repair of old engines and cabins. Companies of private sector are introducing new railway network to cater the needs of passengers. Major railway lines of Pakistan are as under:

1.	Peshawar to Karachi:	Via Rawalpindi, Lahore, Multan, Bahawalpur, Rohri, Hyderabad, Karachi.
2.	Lahore to Quetta:	Via Multan, DeraGhazi Khan, Rajanpur, Sui, Jacobabad, Sibbi, Quetta.
3.	Karachi to Quetta:	Via Kotri, Sehwan Sharif, Larkana, Jacobabad, Sibbi, Quetta.
4.	Quetta to Zahidan:	Via Noshki, Dalbandin, Nokandi, Koh Taftan, Zahidan.
5.	Multan to Rawalpindi:	Via Muzaffargarh, Kot Addu, Layyah, Bhakkar, Jand, Taxila, Rawalpindi.
6.	Lahore to Lodhran:	Via Raiwaind, Kasur, Pakpattan, Vehari, Lodhran.

3. Air Routes

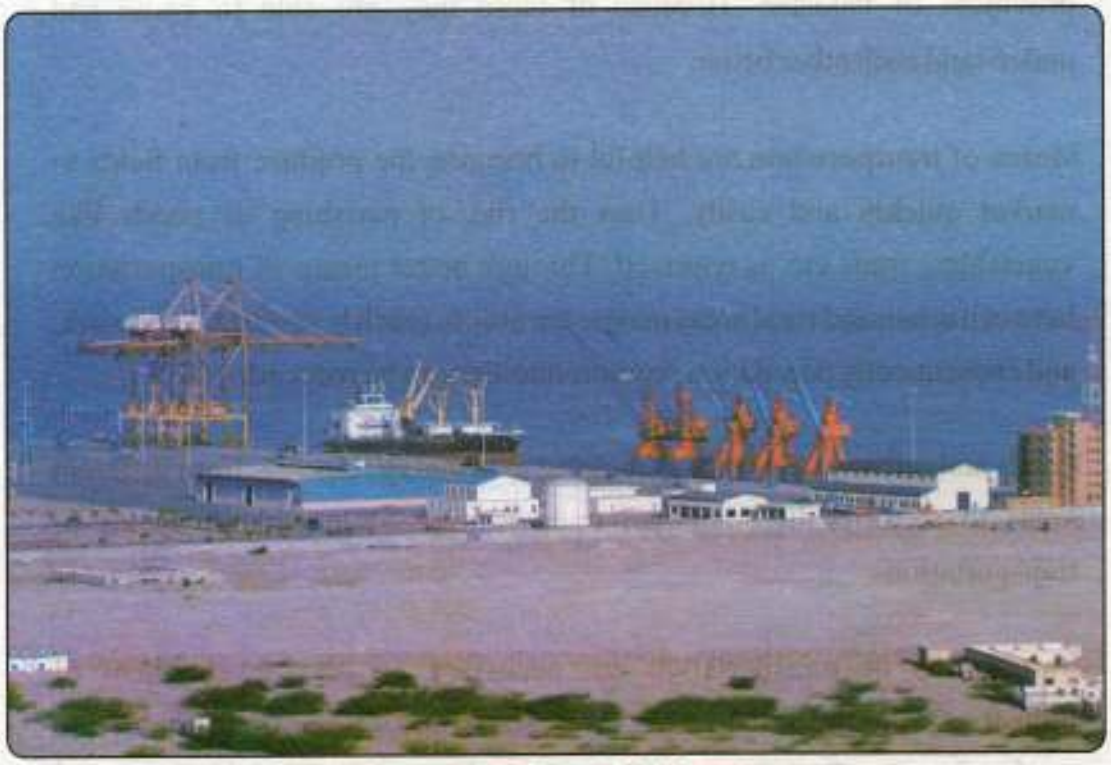
Air planes are fastest means of transportation which enables us to travel thousands of kilometers in few hours. This is also the most expensive means of traveling. Air planes provide comfortable, fast and safe traveling. In 1955



Pakistan International Airlines (abbreviation PIA) was established to provide safer and standard traveling facility to the people. Now it is operating international flights with many countries of the world. International airports of Lahore, Islamabad, Peshawar, Multan and Quetta are very important. Besides PIA, private sector is also operating at domestic level, which includes Shaheen Air International and Air Blue, etc.

4. Water Routes

Water routes are most ancient mean of transportation. Many merchants and travelers adopted these routes. They used to transport their merchandise to other countries through sail and steam boats. Many continents and islands were discovered because of these water routes. In the south of Pakistan lies the Arabian Sea. Most of Pakistani trade is conducted through this sea. It is the cheapest means of goods transport. Heavy merchandise is sent to and brought from other countries through ships.



Port of Gawadar (Balochistan)

Important ports of Pakistan are Bin Qasim, Karachi and Gawadar. Pakistan National Shipping Corporation was established in 1970, which monitors incoming and outgoing ships on these ports. Ports of Ormara, Pasni and Jiwani are also being used on smaller scale as well. Although there are many rivers in Pakistan, but transportation through rivers is too small. Only small boats are used for the transportation of passengers.

IMPORTANCE OF MEANS OF TRANSPORTATION

Importance of means of transportation is described below:

1. Means of transportation are a necessary for the development of a country. Best transportation results in the promotion of trade. Means of transportation are very important for enhancing mutual relations of the people in different provinces of Pakistan. Because of these they are able to know and understand each other better.

2. Means of transportation are helpful in bringing the produce from fields to market quickly and easily. Thus the risk of perishing of goods like vegetables, fruits etc. is removed. Through better means of transportation between urban and rural areas people are able to reach home after their work, and consequently population pressureoncities can be reduced.

3. Roads and railway networks are helpful in bringing minerals from different areas to factories. International trade is impossible without means of transportation.

4. Best means of transportation are necessary for the development of industries. They are used to bring raw material and send finished products to markets or ports. Better means of transportation are helpful in the promotion of trade and development of the country. Better means of transportation can also be helpful in maintaining law and order in the country.

5. Advanced and fastest means of transportation are necessary for national defense. Without them national defense can be at risk.

IMPORTANT POINTS

- ☆ Means of transportation are helpful in transporting people and goods from one to another place.
- ☆ Prosperity and development of a country depends upon fast and advanced means of transportation.
- ☆ Different means of transportation are adopted in different areas of the world according to physical, economic and local needs.
- ☆ Road transportation in Pakistan is cheaper and more popular.
- ☆ National highways and motorways are most important metal roads in Pakistan.
- ☆ Management of highways in Pakistan is under federal government who control them through National Highway Authority.
- ☆ A network of motorways is being established in Pakistan to meet the requirements of advanced age.
- ☆ Railway is safer and cheaper means of transportation.
- ☆ Headquarters of Pakistan Railway is located in Lahore.
- ☆ Air plane is fastest means of transportation.
- ☆ In 1955 Pakistan International Airlines (abbreviation PIA) was established.
- ☆ International airports of Lahore, Islamabad, Peshawar, Multan and Quetta are very important.
- ☆ Water routes are most ancient mean of transportation.
- ☆ Many continents and islands were discovered because of water routes.
- ☆ Most of Pakistani trade is conducted through the Arabian Sea.
- ☆ Important ports of Pakistan are Bin Qasim, Karachi and Gawadar.
- ☆ Pakistan National Shipping Corporation was established in 1970, which monitors incoming and outgoing ships.
- ☆ Best transportation results in the promotion of trade.

EXERCISE

1 Four answers are given for every question. Mark the correct answer.

(i) Mughalpura railway workshop is located in:

(a) Islamabad (b) Multan

(c) Karachi (d) Lahore

(ii) M2 Motorway connects Islamabad with:

(a) Lahore (b) Faisalabad

(c) Kalat (d) Quetta

(iii) Fastest mean of transportation is:

(a) Bus (b) Air Plane

(c) Railway (d) Car

(iv) Silk Road connect Pakistan with:

(a) China (b) India

(c) Iran (d) Afghanistan.

(v) Pakistan International Airlines was established in:

(a) 1955 (b) 1965

(c) 1975 (d) 1985

2 Give short answers.

(i) Write down the names of means of transportation.

(ii) List down important highways of Pakistan.

(iii) Describe the commercial importance of port in three lines.

3 Give answers in detail.

(i) Why advanced means of transportation are necessary for a country?

(ii) Explain the means of transportation in Pakistan.

(iii) Describe the importance of means of transportation.

ACTIVITIES

1. Draw a map of Pakistan and depict major national highways.
2. Take the children on a study tour to a nearby bus station, railway station, motorway or airport and explain their importance.

(Glossary)

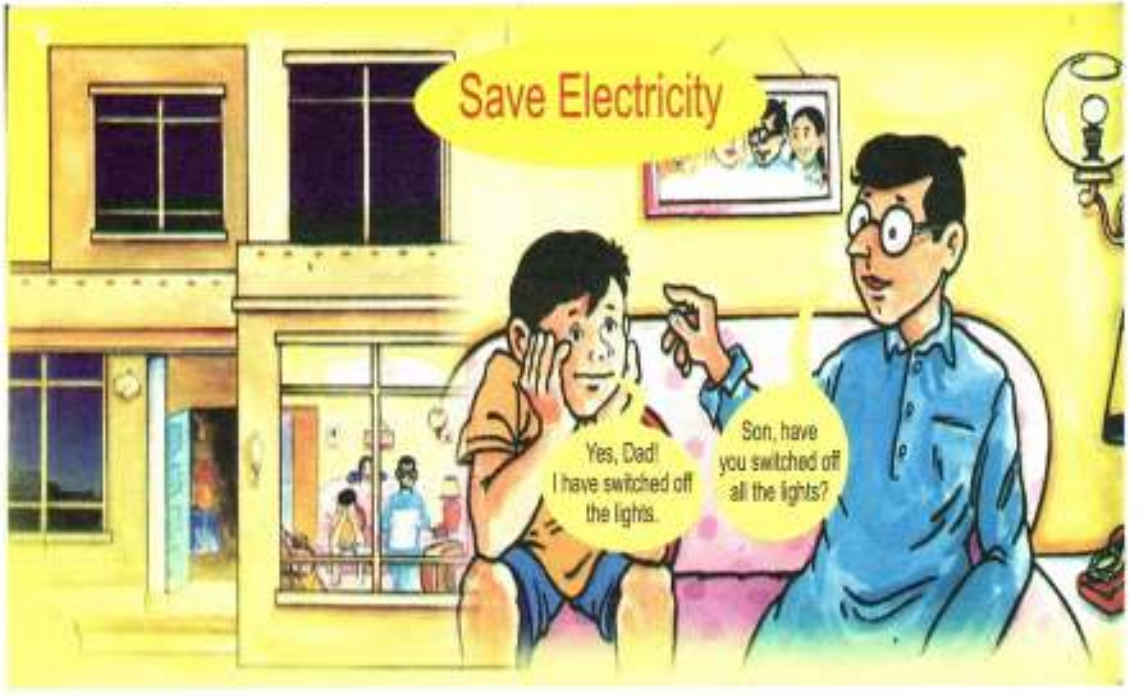
Agriculture	The science, art, and business of cultivating soil, producing crops, and raising livestock; farming.
Clouds	A visible body of very fine water droplets or ice particles suspended in the atmosphere at altitudes ranging up to several miles above sea level.
Condensation	The process by which a gas or vapor changes to a liquid.
Crust	The exterior portion of the earth.
Cyclone	A violent tropical storm, especially one originating in the southwestern Pacific Ocean or Indian Ocean.

Domestic trade	Also known as internal trade or home trade. The exchange of domestic goods within the boundaries of a country.
Earthquake	A sudden movement of the earth's crust caused by the release of stress accumulated along geologic faults or by volcanic activity.
Exports	To send or transport (a commodity, for example) abroad, especially for trade or sale.
Fault	A fracture in the continuity of a rock formation caused by a shifting or dislodging of the earth's crust, in which adjacent surfaces are displaced relative to one another and parallel to the plane of fracture.
Hailing	Precipitation in the form of spherical or irregular pellets of ice larger than 5 millimeters (0.2 inches) in diameter.
Humidity	Dampness, especially of the air.
Imports	To bring or carry in from an outside source, especially to bring in (goods or materials) from a foreign country for trade or sale.
Ishoyet'	A line drawn on a map connecting points that receive equal amounts of rainfall.
Karez	A method of irrigation in which groundwater is tapped by a tunnel. After running for some distance the tunnel comes out in the open and the water is conducted to the command area.
Local winds	Winds which, over a small area, differ from those which would be appropriate to the general pressure distribution, or which possess some other peculiarity.

Means of irrigation	To supply (dry land) with water by means of canals, ditches, pipes, or streams.
Means of transportation	General term for the different kinds of transport facilities that are often used to transport people or goods.
Metallic minerals	Those minerals which can be melted to obtain new products, for example Iron, cooper, bauxite, tin, manganese.
Mining	Extraction of solid mineral resources from the earth.
Mixed farming	Method of farming in which crop production is combined with the rearing of livestock.
Non-metallic minerals	Non-metallic minerals are those which do not yield new products on melting, for example coal, salt, clay, marble.
Permanent winds	Winds caused by permanent differences of pressure.
Precipitation	Condensed moisture that falls to the surface of the earth in the form of rain, sleet, snow, hail, frost, or dew.
Rain gauge	An instrument to gather and measure the amount of liquid precipitation over a set period of time.
Seasonal winds	Winds that blow only during certain season is known as seasonal or periodic winds.
Seismograph	An instrument that records vibrations in the earth, especially earthquakes.
Sleet	Precipitation of small and partially melted grains of ice.

Snowfall	The rate at which snow falls; this is usually expressed as inches of snow depth per 6-hour period.
Solar energy	Radiations from the Sun that can produce heat, generate electricity, or cause chemical reactions.
Spring	Natural flow of water from the ground or from rocks.
Volcanism	The movement of magma and its associated gases from the interior into the crust and to the surface of the earth.

Everybody is sitting in one room whereas the whole house is fully lit.



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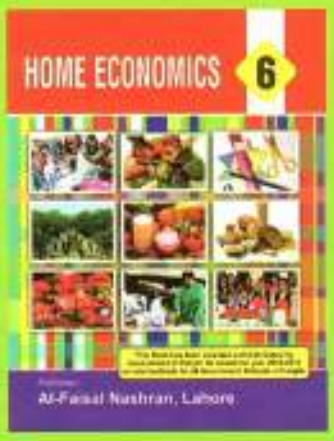

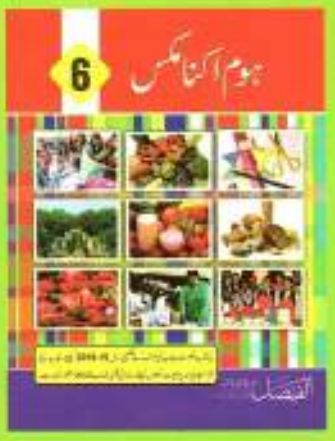

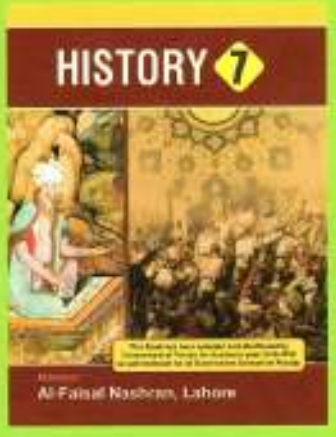

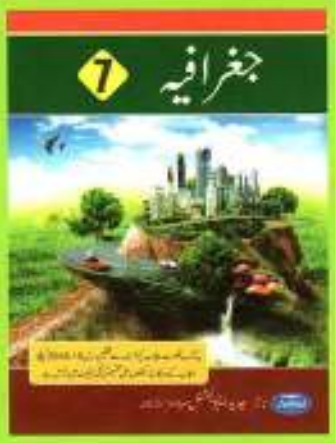

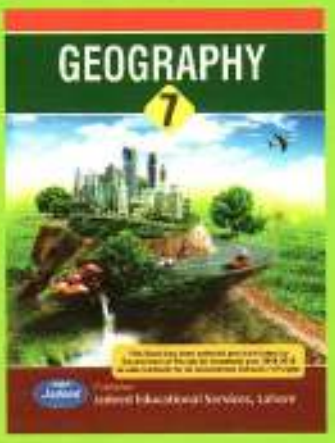

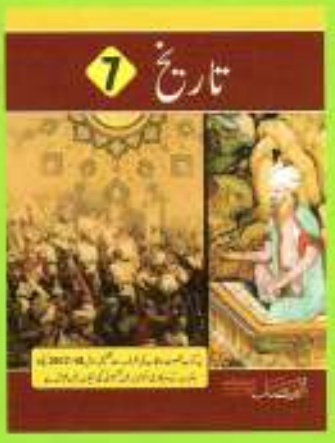

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