HS-105 CHAPTER-II LAND OF PAKISTAN

Topic 1: Geophysical conditions: -

Pakistan is situated between the latitudes of 23 & 36 degrees North and between the longitudes of 61 & 75 degrees East. The country has an area of 796095 sq. Kms. The region changes from coastal beaches and creeks in the south to deserts, plateaus, fertile plains, middle and high mountains, snow covered peaks and glaciers in the north.

The landscape of Pakistan can be divided into six major regions:

1. **The Northern high mountainous region**
2. **The western low mountainous region**
3. **Potohar Plateau and salt range**
4. **The Punjab plain**
5. **The Sindh plain**
6. **The Baluchistan plain**

1. THE NORTHERN HIGH MOUNTAINOUS REGION: -

Stretching in the north from east to west are a series of high mountainous ranges, which separate Pakistan from China, Tajikistan and Afghanistan. These include Himalayas, Karakorums and Hindukush. Many peaks in the region are higher than 7925 meters and the highest peak of Pakistan is K-2 (8611 m) which is second to the highest peak in the world Everest. Technically K-2 is more difficult to climb than the Everest.

The ranges lose their height gradually towards south and settle down finally in Margalla Hills in the vicinity of Islamabad and Swat, Chitral hills and in the north of river Kabul.

Out of 50 highest peaks in the world, 40 are in Pakistan. The country has 5 peaks, which are above 8000 meters.

Pakistan has more glaciers than any other land outside the North and South poles. Pakistani glacier area covers about 13680 sq kms.

2. THE WESTERN LOW MOUNTAINOUS REGION: -

The western low mountainous region spreads from swat-chitral hills in north-south directions and covers a large portion of the province Khyber Pakhtunkhwa. Altitudes of these mountains range from 5000 to 6000 ft in Mahmand and Malakand hills.

The most significant ranges in western Pakistan are Suleman and Waziristan mountains. Passes through these mountains are of special geographical and historical interest. From North to South these are Khyber Pass, Kurram Pass, Tochi Pass, Gomal Pass and Bolan Pass. Khyber Pass is sufficiently wide for the passage of troops. Its highest point Landikotal is only 1067 m high and leads to the fertile valley of

Peshawar. Kurram Pass connects Pakistan and Afghanistan near Parachanar. Tochi Pass connects Ghazni in Afghanistan with Bannu in Pakistan. Gomal Pass provides a route from Afghanistan to Dera Ismail Khan. Bolan Pass connects Kachhi-Sibbi plain with Quetta. From Quetta a route leads to Chaman on Pak-Afghan border and then to Qandhar.

3. POTOHAR PLATEAU AND SALT RANGE: -

The Potohar plateau varies in height from 300 to 600 meters and covers an area of 18000 sq kms. It is bounded on the East by Jehlum, on the West by Indus, on the North by Kalachitta ranges and Margalla hills and on the South by Salt range.

The salt range starts from Jehlum district in Jogi Tilla and Bakrala ridges. It crosses the Indus near Kalabagh and continues southwards into the districts of Bannu and Dera Ismail Khan. Average height of the ranges is 671 m and Sakesar peak is 1525 m high. The range contains huge quantities of rock salt, gypsum and coal.

4. THE PUNJAB PLAIN: -

The Punjab plain comprises mainly the province of Punjab. It is the gift of river Indus and its five tributaries, Jehlum, Chanab, Ravi, Satlaj and Beas. The plain spreads from South of Potohar Plateau up to Mithankot where Suleman ranges approach the river Indus. The Punjab Plain is almost a featureless plain with a gentle slope averaging 1 ft per kilometer.

The Southeastern section of the region, known as Cholistan, is a desert and the area remains under the grip of extremely hot winds. The surface of this desert consists of a succession of sand dunes rising to a height of 500 ft.

5. THE SINDH PLAIN: -

The Sindh plain comprises mainly the province of Sindh and stretches between the Punjab plain and Arabian Sea. River Indus flows here as a single river and the plain comprises a vast fertile area. On the right bank towards west of the river, there is a narrow strip of flood plain and on the left bank towards east there is a vast desert (Thar).

There are many lakes in Sindh, which attracts thousands of migratory birds during winter from central Asia. Mancchar Lake is the largest with an area of 200 sq miles.

There are 15 large creeks in the Indus delta, which are 10 to 30 kms long. The seaport of Pakistan, Port Qasim, is situated in Phitty creek in which Korangi and Gharo creek joins. All the creeks of the Indus delta are full of natural beauty. At the extreme northwestern end of the Indus delta is the largest city of Pakistan, Karachi, which is also a seaport for the country.

6. THE BALOCHISTAN PLATEAU: -

Balochistan plateau consists of dry valleys, saline lakes and a vast area of desert with dry hills, generally running from Northwest to Southeast. The plateau has an average altitude of over 600 m. Between Suleman and Tobakakar ranges is Zhob Valley, which slopes down to the North and joins D.I.Khan. It is bounded on the south by Bugti and Marri Hills, below which runs the Bolan River. In the south lies the desert plateau, which is divisible into two smaller zones, the central Makran and Brohi Hills. In the Northwest there is a Salt Lake Hamun-e-Mushkhel into which several small rivers fall. Along the coast there are large areas of leveled mud lands forming the coastal plain bordered by sandstone ridges.

Topic 2: Geo-political situation and its importance: -

Territorially Pakistan's situation in the world is important from a Strategic as well as from an economic point of view. It is located at the junction of China, India, Central Asia and Iran. Its location at the head of the Persian Gulf, Gulf of Aden and Arabian Sea attracts the United States towards it. Secondly, Pakistan has been very close to one of the super powers, that is why both super powers had given it a great importance in their defense policies.

Thirdly, Pakistan is situated near the areas that are the main source of oil supply to the west.

Fourthly, Pakistan is close to Northeast Africa, West Asia and Indian Ocean that were significant for the U.S. and former U.S.S.R. Finally, Pakistan is geographically and regionally a part of continuation of Muslim West Asia and Southwest Asia. Pakistan's membership of CENTO explains this geographical fact.

In the North and Northeast of Kashmir there are Chinese territories of Sinkiang and Tibet. Pakistan-China border is 620 Km long. On the west, low and dry hills separate Pakistan from Afghanistan. The border between Pakistan and Afghanistan is known as Durand Line. It is about 2334 km long. To the southwest in Balochistan, Pakistan has a common border with Iran, which is 833 km long. In the East, the Indian territories of the Punjab and Rajhistan bound Pakistan. Pak-India border is 1517 km long, for the most part of which there are no natural features like rivers and mountains to form the boundary and this situation explains the border disputes that have taken place so far.

The U.S. was interested in Pakistan because of its strategic location. Pakistan could serve as an ideal spy and military base for the U.S. from where it could keep a check on communist powers like China and the U.S.S.R and also to safeguard its oil interests in the Persian Gulf.

Due to its Geographical location, Pakistan has faced many threats to its security from both the East and the West. As the cold war period has passed, Pakistan's location could enable it to serve as a linchpin for trade, communication and other forms of co-operation among the three adjacent regions of South Asia, Central Asia and West Asia. In the new world order that is emerging, economy will have greater prominence than politics.

The emergence of five newly independent central Asian states has created a new geographical situation for the country, because it offers the landlocked central Asian states, the shortest outlet to the sea. In return, Pakistan can gain immense economic and strategic advantages.

Pakistan has a great potential for maritime security, a self- reliant and self-sustained economy not only sufficient to itself but also to the E.C.O community. Pakistan's coasts have now acquired a new importance. The construction work for a naval base at Ormara has already been started which will be followed by the construction of a commercial port there. Another important seaport is Gwadar, capable of being developed into a deep seaport. Gwadar is ideally located to serve as a gateway to boost international import and export trade and traffic for the E.C.O region. Gwadar has both natural resources and geo-strategic location. Other ports in the region are on the wrong side of the Gulf i.e., incapable of satisfactory commercial service to Central Asian States and landlocked Afghanistan. Other ports in the region are not only congested, most of them are located in war zones, with vulnerable political situations and interstate conflicts such as Iran, Iraq and Kuwait. Dubai is about 500NM away from Gwadar. A ship will take about 30hrs more to reach Dubai with extra running expenses of about $100,000 for a 20,000-ton ship. In this way Gwadar is the best choice because it offers ideal conditions for building a deep seaport and secondly it is less vulnerable to Indian naval blockade which Pakistan faced during 1971. Gwadar is located in open sea, outside the Strait of Hormuz, hence it would not become congested. It has easy direct road access to India, China, Afghanistan and Iran and a secondary road access to all Cantral Asian States.

The network of roads will finally connect it with China. With the construction of a deep seaport, Gawadar could, very well, be connected with the E.C.O highway for overland trade.

Pakistan's railway network can be connected with the central Asian network to the immense benefit of Pakistan and Afghanistan. This has since long been a well-studied feasible project to connect central Asia by railway from Caspian Sea to Sinkiang and down to Karachi.

The flying time from Islamabad to the capitals of five of the six Muslim republics, Astana (Kazakhstan), Dushunbe (Tajikistan), Ashkabad (Turkemanistan), Tashkent (Uzbekistan) and Bishkek (Kirghistan) is less than that from Islamabad to Karachi while Baku (Azerbaijan) is another half an hour distant.

The opening up of various trade routes with central Asia through and around Afghanistan by road, by rail and by air can provide Pakistan with safe lines of communications. After losing the support of western alliances, Pakistan has a unique opportunity to create a powerful new bloc in the heart of Asia. Once again Pakistan's geography can determine a new direction for the country.

Topic 3: Natural resources and Minerals: -

MINERAL RESOURCES: -

Exploration and development of mineral resources is essential to meet the increasing need for inputs such as fuels and raw materials for steel, petrochemicals, fertilizers, cement and other industries. Geological survey of Pakistan, foreign oil companies and other agencies have explored five regions, which are comparatively rich in minerals:

1. **The salt range and Makerwal region (rock salt, gypsum and coal)**
2. **The Potohar Plateau (oil)**
3. **North Eastern Baluchistan and adjacent parts of Waziristan (natural gas, coal, chromite and marble)**
4. **Lower Indus Plain (natural gas and coal)**
5. **Chitral (iron)**

IMPORTANT MINERALS FOUND IN PAKISTAN: -

NATURAL GAS: - It is a valuable natural resource found in Pakistan. Natural gas is comparatively cheap and a very efficient source of energy in the country. Total estimated reserves are 1585 billion cubic ft. The natural gas of Pakistan has high methane content, usually 70 to 90%. The first gas field was discovered at Sui in 1952 while drilling for oil. It is one of the largest gas fields in the world.

OIL: - The search for oil in the areas of Pakistan started in 1868 when the first test hole was drilled at Kundal near Mianwali and continues up to the present day. Parts of Pakistan adjacent to the oil and gas producing fields of Iran have similar geological history. Traces of oil occur at several other places and exploration continues in the Punjab, Sindh and Balochistan.

COAL: - Coal is one of the principal minerals found in Pakistan. The largest coal reserves are found in Sindh, measuring approximately 175 billion tonnes. Sizeable deposits of coal exist in Balochistan, salt range and Sindh. Thar coal reserves are one of the largest coal reserves in the world.

The coal found in Pakistan is of low quality with high ash and sulphur contents having low heat value. Coal is mainly used in brick burning, ceramics, ginning mills and for firing the boilers of power stations and steam locomotives.

IRON: - Iron ore deposits occur in many areas of Pakistan. The most important are Kalabagh, Dommel Nisar, Abbotabad and Chilghazi.

The deposits of Kalabagh are the largest deposits of iron ore in Pakistan. Reserves are estimated at 300 million tons. But the ore is of low grade (30 - 35% iron.

The deposits of Dommel Nisar are in south of Chitral. Iron content in the deposits is 55 – 65%. The reserves are estimated at 3 million tons.

Abbotabad deposits occur on the eastern side of the city. Iron content varies from 14 – 46%. Total reserves are estimated to be over 100 million tones.

Chilghazi iron ore deposits are in Chaghi district. Reserves of high-grade iron ore (55% or more) are estimated to be over 3 million tons and of low-grade ore (25 – 30% iron) at 20 million tones.

CHROMITE: - Large deposits of chromite occur in Muslim bagh area of Zhob valley. These are the best-known chromite deposits in Pakistan. Chromite is used in making stainless steel, high-speed tools, dyes and in photography.

ROCK SALT AND BRINE: - All the rock salt deposits in Pakistan occur in salt range. The most important mines are at Khewra, Warachha, Kalabagh and Jatta. Khewra is the most extensively worked area with seams attaining thickness of about 18 meters. The deposits have been working since 1872.

Salt is also obtained from brine and salt lakes but the amount obtained from these sources is relatively small when compared with that of rock salt. Salt is found in Tharparkar where a 2-meter-thick layer covers an extensive area. It is also obtained by evaporating seawater at Maripur and along the coast of Makran.

GYPSUM: - Gypsum deposits occur in western mountains of Pakistan. Those at Khewra and Daudkhel are the best known. The deposits vary in color, light gray to white and reddish pink are most common. Gypsum is used in the manufacture of cement, plaster of Paris and fertilizers. Reserves are estimated at 350 million tons.

LIMESTONE: - Limestone is widely spread in Pakistan but some areas have more concentrated deposits. These include Kohat, Naushehra, Salt range, Potohar plateau, Margalla hills, Manghopeer and Daudkhel. Total annual production is about 3.5 million tones. Lime is the main ingredient of cement and is also used by glass factories and chemical industries.

MARBLE: - Good quality marble in a wide range of colors is found in many parts of Pakistan. The best-known deposits are in Khyber agency, Mardan, Naushehra, Swat and Chaghi. Valuable deposits also occur in Azad Kashmir and Attock. In Khyber agency, the workable marble is in the lower section of the quarry and is over 30 meters thick. The white marble of Pakistan compares well with the famous Italian marble. The marble of Mardan and Swat is white crystalline and is of uniform texture. In haghi, there are vast flat terraces of marble. Its production is hindered by the problems of transportation and shortage of water. In Pakistan, marble is one of the principal foreign exchange earning minerals.

Copper & Gold: -

Major reserves of copper and gold have been recently discovered in Rekodiq area of Balochistan. It is estimated that the reserves would contribute about $1.25bn annually to the national economy. This is a major discovery by all international standards.

The Rekodiq mining area has estimated reserves of 20bn tons of copper and 20m oz of gold (1 oz =28.34gms). Estimated value of the deposits is about $65 bn tons, which would generate thousands of jobs. The discovery has ranked Rekodiq among the top seven copper reserves.

The Rekodiq project is estimated to produce 200,000 tons of copper and 400,000oz of gold per year. The project will however require about $1bn investment to start commercial production.

Lithium: -

According to an agreement signed on 10th Nov, 2022, Pakistan and China will collaborate on the research and application of lithium resources in Pakistan. Lithium reserves have emerged as an important source in the Electric Vehicle (EV) industry around the world including Pakistan. Pakistan has the capacity to produce 1-3 million tons of lithium per annum currently priced at 10,000-12,000 USD per ton. These reserves are located in Northern Areas at Shigar Valley, Sakardu, Dasu and Gilgit.

MISCELLANIOUS MINERALS: -

China clay deposits occur in the Tharparkar district, Hazara district and Swat. Antimony is mined in small quantities in Chitral. Traces of radioactive minerals have been found in Khyber Pakhtunkhwa and Dera Ghazi Khan. Asbestos is found in north of Muslim Bagh, sulphur in Chaghi, bauxite in Hazara and manganese in Lasbella and Kohat. Copper deposits have been located in Saindak and Chaghi districts. Reserves are estimated at 412 million tones. To explore and expand the gemstone industry, the gemstone co-operation was established in 1979.

WATER RESOURCES: -

THE INDUS SYSTEM: - The Indus system includes a large number of tributaries but the most important rivers are Jehlum, Chanab, Ravi, Satlaj and Bias. Two of these combine in India, Satlaj and Bias, before entering into Pakistan. The Indus and its tributaries traverse long distances through Himalayas and capture most of their flow before entering into the plains of Pakistan.

The volume of water in the rivers is subjected to vast seasonal fluctuations. It is small in winter and increases gradually with the approach of summer as the snow in mountainous catchments begins to melt. The volume of water in the rivers in early summer months varies with their size, altitude and situation with respect to monsoons.

In Indus, Jehlum and Chanab, the volume of water increases after March but this increase comes later in the eastern rivers. The approach of the rainy season at the end of June or early July is marked by a great increase in flow. The period of high flow comes to an end in September but continues for another month in the eastern rivers. The decrease in flow after the peak months is as sharp or even sharper than the risk before it. Floods generally occur in the early part of the rainy season in western rivers. As 60% of the flow in the Indus system is concentrated in the three rainy months, there is a great need for reservoirs and dams to regulate the flow, to reduce floods, to provide more water for irrigation and to prevent loss to sea. Further the flow of Ravi, Satlaj and Bias has been lost to India and must be replaced from other sources.

DRAINAGE PATTERN OF BALOCHISTAN: - The rivers of Balochistan flow only during rainy season and smaller rivers are dried not only for greater part of year but also for several consecutive years. Some of the rivers are perennial only in their lower reaches. Some rivers for example, Hingol and Bolan flow intermittently above and below the ground and disappear into the limestone region.

Power Resources

Power Generation Capacity in Pakistan

The total installed power generation capacity in Pakistan is approximately 41000 MW and requirement is approximately 91000 MW

The main sources of electricity generation in Pakistan are hydel, oil, gas, coal and nuclear power. Among these, hydel power is the only renewable source of energy; the others are mainly fossil fuels. At present hydel power is also the least expensive form of electricity. The potential of hydropower generation in Pakistan is around 60,000 MW.

Hydro power Generation Projects

There are five major hydropower generation projects in Pakistan; namely, Tarbela, Mangla, Warsak, Chashma and Ghazi Brotha. There are also several smaller hydel schemes and their combined capacity is about 108 MW.

The generation cost of hydel energy is the lowest among all options but it also has more variations due to seasonal changes in the flow of water. Therefore, there is a higher tendency of cost fluctuation in hydel energy as compared to thermal and nuclear energy.

The capacities of the three existing reservoirs of the Indus Basin; Tarbela , Mangla, and Chashma are declining due to sedimentation. The live storage capacity of these three reservoirs has been reportedly reduced by about 20%. WAPDA has announced plans to undertake studies for a number of storage projects on the Indus and its tributaries, in the Vision 2025 programme.

Thermal Power Generation Projects

In Pakistan thermal power stations are operated by three major institutions; WAPDA operates 11 stations, KE operates 4 stations, and IPPs (Independent Power Producers) run their private power stations which are at least 14 in number.

Nuclear Power Generation Projects

There are three nuclear power plants in Pakistan, namely KANUPP, Chashma -1 and

Chashma- 2. Karachi Nuclear Power Plant (KANUPP) celebrated its 49th anniversary of safe operation on 30th Dec. 2021. Two more nuclear power plants, Chashma-3 and Chashma-4 are currently under construction.

In the 21st century nuclear power plants are not considered a very favourable option due to huge costs of decommissioning (putting an installation out of service) and catastrophes of national scale in case of accident.

Solar Energy

Solar energy supports all life on earth and is the basis of almost all forms of energy, which we use. Amount of solar energy that falls on earth is enormous. It will be surprising to note that all energy stored in earth's reserves of coal, oil and natural gas is just equivalent to energy from 20 days of sunshine. Yet solar energy accounts for only 1% of global energy sources.

Solar energy is the most abundant, widely spread and very clean source of energy. It has a wide range of applications. This is an excellent alternative to fossil fuels, particularly for such developing countries as Pakistan that receive high levels of solar radiation.

Pakistan is ideally located in the Sunbelt to take advantage of solar energy technologies. This energy source is widely distributed and abundantly available in the country. Balochistan province is particularly rich in solar energy. It has the highest annual mean sunshine duration in the world. Every day the country receives an average of about 19 mega-joules per square metre of solar energy. The development and adaptation of solar energy technologies in Pakistan can bring a revolution in the life & living standards of people.

Wind Power

Pakistan has about 800KM of coastline where the speed of wind is extremely suitable for generation of electricity. On 24th Dec. 2012, a 50MW windmill project was inaugurated in Jhimpir near Thatta. The wind map developed by National Renewable Energy Laboratory (NREL), USA in collaboration with USAID, has indicated a potential of 346,000 MW in Pakistan.

Bio-Gas

Pakistan breeds sufficient livestocks to produce enough animal waste for the production of bio-gas. There is a huge potential of using bio-gas as rural energy throughout the country by a network of community bio-gas plants.

Pakistan, like other developing countries of the region, is facing a serious challenge of energy deficit. Renewable energy sources can play an important role to meet this challenge.