



IGCSE 0448 Pakistan Studies Geography Resources

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Chapter 1

Introduction to Pakistan

Syllabus Breakdown

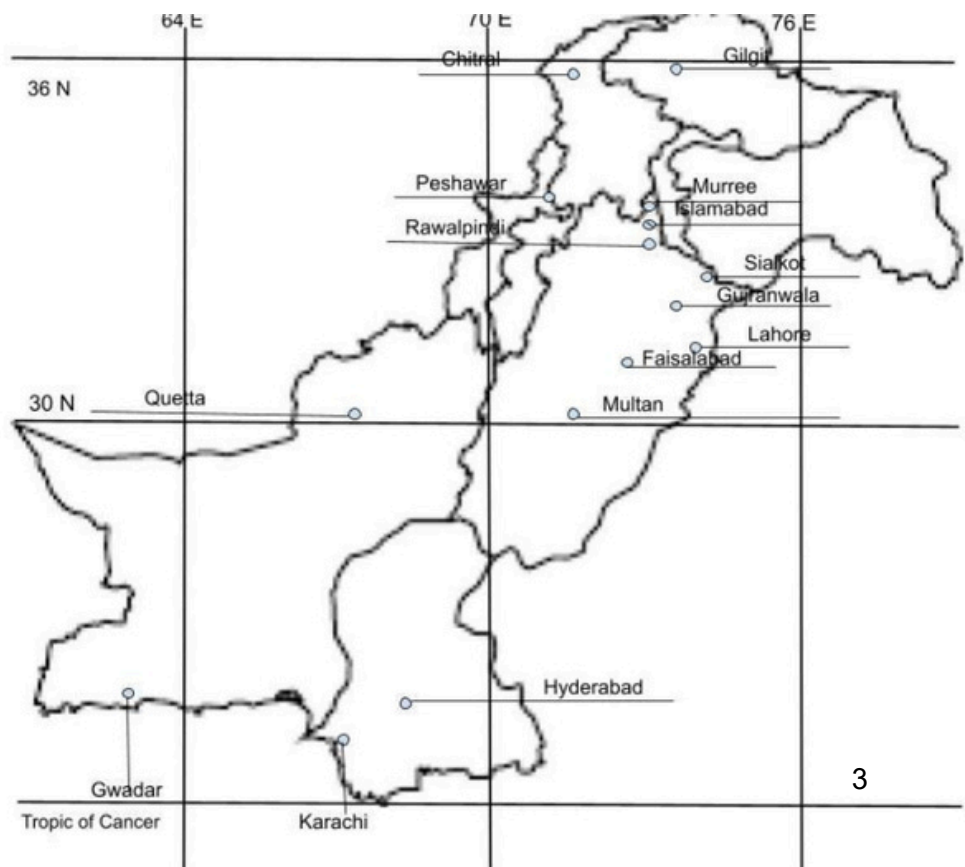
a) Location of Pakistan
Candidates should be able to identify the following on a map: the Tropic of Cancer, Latitudes 30°N, 36°N, longitudes 64°E, 70°E and 76°E The Arabian Sea The countries sharing a border with Pakistan, and Pakistan's position in relation to others in South and Central Asia
b) Location of administrative areas and cities
Candidates should be able to identify the following on a map: the administrative areas of Pakistan named cities: Islamabad, Muree, Rawalpindi, Gujranwala, Lahore, Faisalabad, Multan, Sialkot, Peshawar, Chitral, Gilgit, Hyderabad, Karachi, Quetta and Gwadar

Map 1.1

Provinces of Pakistan:

- 1- Balochistan
- 2- Sindh
- 3- Punjab
- 4- KPK
- 5- Gilgit Baltistan
(achieved provincial status in 2021)

Topic 1.1.2



Neighbouring Countries and Border regions



Note: Always remember to use coordinates while attempting direction-base questions

To the **west**, there is **Afghanistan** (border known as the **Durand Line**).

To the **north-east**, there is **China**.

To the **east**, there is **India** (border known as the **Radcliffe Line**).

To the **southwest**, there is **Iran**.

To the **northwest**, lies the **Wakhan Corridor** of **Afghanistan**, which separates Pakistan from **Tajikistan**.

Topic 1.1.3

Pakistan's size and coordinates

Size: 796,096 km

Coordinates:

Latitude: 24'35 N to 37'05 N

Longitude: 61 E to 78 E

Length: 1600 km

Width: 885 km

Topic 1.1.4

Regional Importance

1. Strategic Location

- Pakistan lies at the crossroads of South Asia, Central Asia, and the Middle East.

Acts as a bridge between the oil-rich Middle East, resource-rich Central Asia, and populous South Asia.

2. Warm Water Ports

Karachi Port and Port Qasim: major seaports handling most trade.

Gwadar Port: a deep-sea warm water port near the Persian Gulf, close to Strait of Hormuz (world's main oil shipping route).

Gives Pakistan huge geo-economic and geo-political value.

3. China Connection

Through CPEC (China-Pakistan Economic Corridor), Pakistan connects China to the Arabian Sea via Gwadar.

Provides China access to warm waters and shortens its trade route to the Middle East and Africa.

Strengthens Pakistan's role in regional trade and energy routes.

4. Jinnah International Terminal (Karachi)

Pakistan's largest international airport.

Serves as a hub for trade, travel, and international connectivity.

Supports Pakistan's role as a regional transit point for air routes linking East Asia, Middle East, and Europe.

Examination Based Questions [Topic 1]

1- Explain the regional importance of Pakistan with regard to its location [5]

Pakistan lies at the crossroads of South Asia, Central Asia, and the Middle East, giving it strategic importance.

It acts as a bridge between the oil-rich Middle East, resource-rich Central Asia, and populous South Asia, making it vital for trade and energy routes.

Warm water ports (Karachi, Port Qasim, Gwadar) give Pakistan access to international trade and energy shipping routes.

Gwadar Port, near the Strait of Hormuz, provides global geo-economic and geo-political value.

Through CPEC, Pakistan connects China to the Arabian Sea, strengthening regional trade links.

(Any 5 developed points = 5 marks)

2- State the size and coordinates of Pakistan's location. [3]

Size: 796,096 km²

Latitude: 24°35'N to 37°05'N

Longitude: 61°E to 78°E

(3 briefpoints = 3 marks)

3- Label the provinces of Pakistan [2]



4. Past Paper Questions

(a) Study Fig. 1.1, a map of Pakistan.

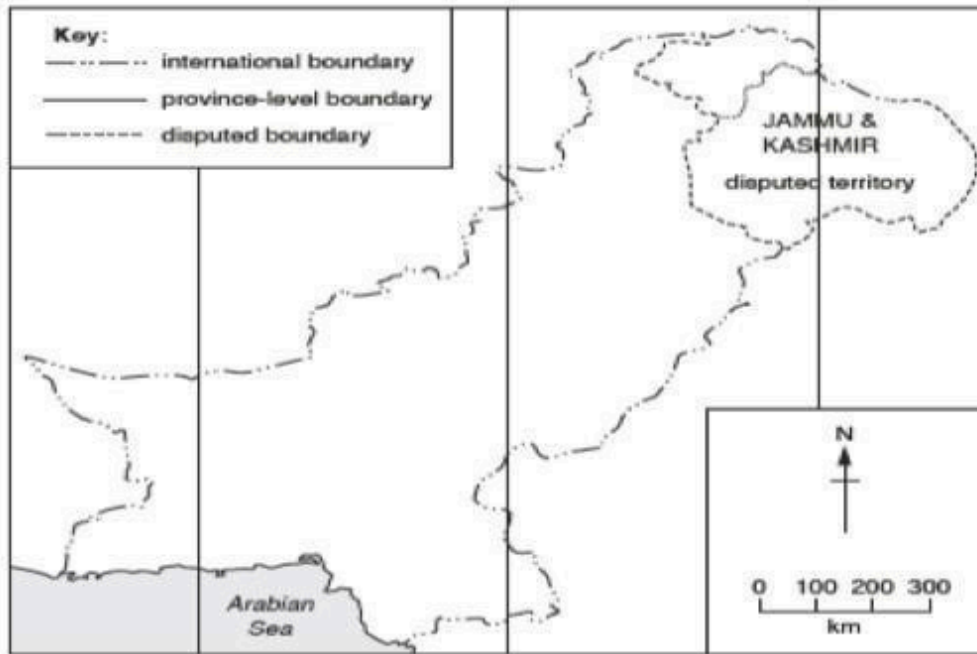


Fig. 1.1

- (i) On Fig. 1.1, label the following: Afghanistan; India; Line of longitude 70°E
 You should write the name in the correct location on the map. [3]
- (ii) On Fig. 1.1, draw and label the Tropic of Cancer. [2]
- (iii) Describe Pakistan's location in relation to other countries in South and Central Asia.

 [3]

O/N13/P2/Q3(C AND D)

(c) Study Fig. 5, a map of Pakistan.

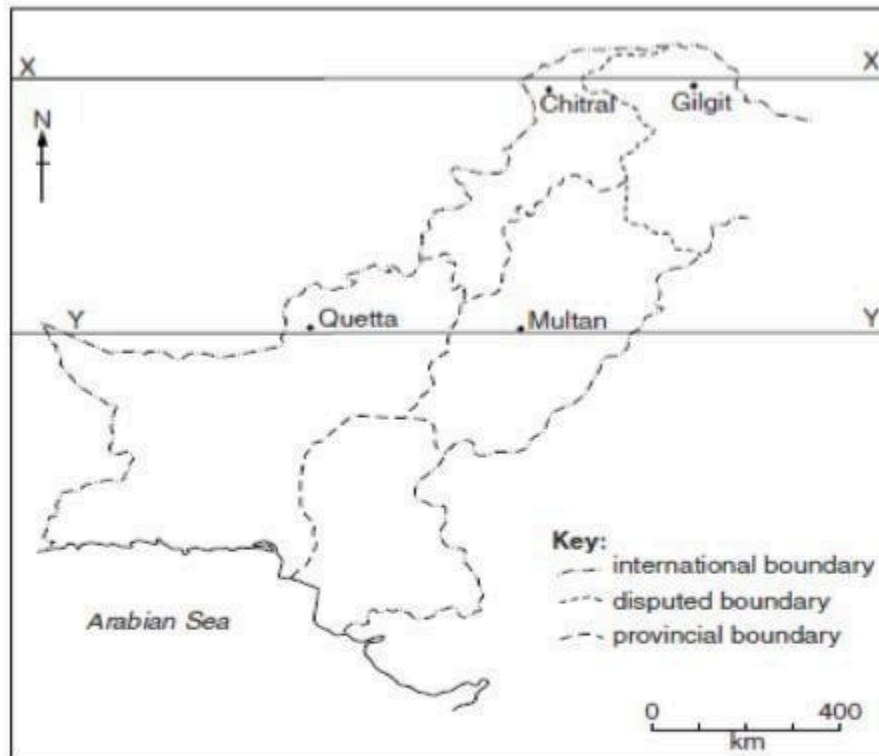


Fig. 5

(i) Give the latitude of the lines X – X and Y – Y.

X Y [2]

M/J12/P2/Q2(A,B AND C)

(a) Study Fig. 2 and name the following:

(i) the line of latitude A;

.....

(ii) the mountain pass B;

.....

(iii) the road C;

.....

(iv) the province D.

..... [4]

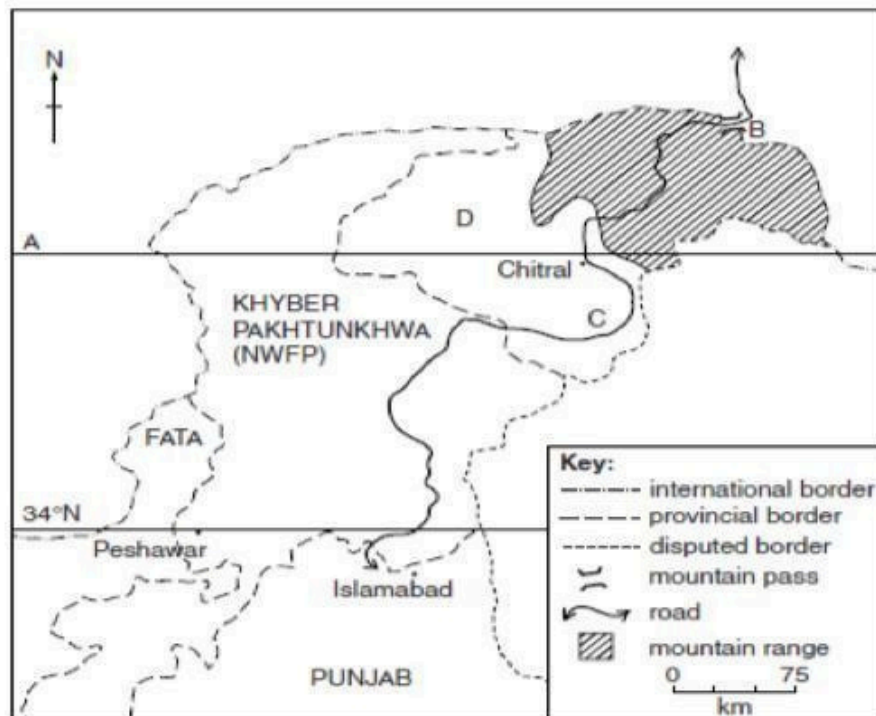


Fig. 2

blue colour on text indicates content not specified in the syllabus breakdown

Chapter 2 — The Natural Topography & Climate of Pakistan

Overview & scope

Physical regions (mountains, plateaux, plains, deserts, coast).

Rivers, drainage and the Indus Basin (structure, uses, problems).

Soils, vegetation and land use across regions.

Climate controls, seasonal patterns, monsoon & western disturbances.

Weather hazards: **floods (riverine, flash, urban), droughts (meteorological, agricultural, hydrological), storms (cyclones, cloudbursts, severe local storms), and Glacial Lake Outburst Floods (GLOFs)** .

- Infrastructure & human response: dams, irrigation systems, early warning, mitigation and sustainable adaptation.

1) Major Physical Regions — detail, formation, resources & human use

1.1 Northern & North-western mountain systems (Himalaya, Karakoram, Hindu Kush)

Location & form: High, steep mountain chains in extreme north and north-east. Karakoram contains **K2 (8,611 m)**; Himalaya includes Nanga Parbat (~8,126 m); Hindu Kush stretches into Afghanistan (Tirich Mir ~7,690 m). These ranges are young fold mountains formed by Indian-Eurasian plate collision.

●**Glaciers & hydrology:** Thousands of glaciers (e.g., Baltoro, Siachen) feed the headwaters of the Indus and tributaries crucial year-round water source. Glacier melt provides dry-season baseflow but is sensitive to warming.

Soils & vegetation: Alpine meadows, conifer forests (deodar, pine) at mid altitudes; sparse above snowline. Soils thin and often stony.

Human use & constraints: Tourism/mountaineering (economic potential), hydro-electric sites in valleys; but steep slopes limit agriculture, risk of landslides, seismic hazard and difficult transport (Karakoram Highway).

trade routes and tribal grazing.

1.3 Potwar plateau & Salt Range

Geology: folded rocks with important **salt deposits** (**Khewra**), gypsum, limestone. Potwar has oil fields (Attock). Soils variable; small-scale agriculture and orchards in irrigated pockets. [Encyclopedia Britannica](#)

1.4 Indus Plain (Upper: Punjab; Lower: Sindh)

Formation & soils: Alluvial fan & floodplain built by millennia of sediment from the Himalaya/Karakoram — highly fertile. Principal cropping region (wheat, rice, cotton, sugarcane).

Irrigation & settlement: Extremely dense population due to irrigation network (canals, barrages). Problems: salinity, waterlogging in poorly drained areas; groundwater extraction in some areas causing subsidence and falling water tables.

1.5 Deserts (Thar, Thal, Cholistan)

Climate & land use: Low rainfall (<250 mm in many areas), sparse vegetation; Thar supports some rainfed cultivation and seasonal grazing; Thal has been partly irrigated (canals) and converted to agriculture in places. Desertification and overgrazing are local concerns.

1.6 Coastal lowland & continental shelf

Sindh & Makran coast: Indus delta ecology (mangroves), fisheries, seaports (Karachi, Qasim, Gwadar — strategic for trade). Coastal erosion and sea salinity intrusion are growing problems in some delta areas.

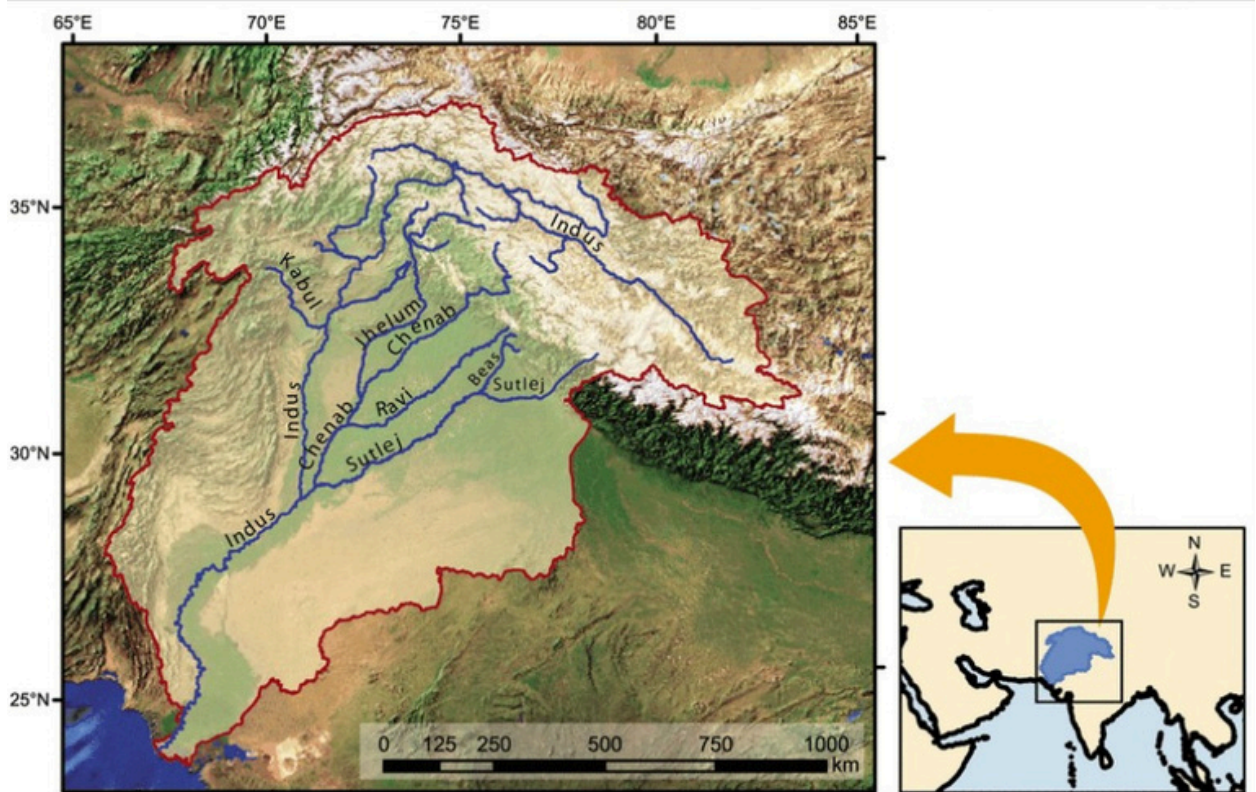
2) Rivers, drainage & water management — full detail

Indus River system: Indus main channel + five major tributaries (Jhelum, Chenab, Ravi, Sutlej, Beas — note: Beas largely in India). The Indus drains a huge international basin (sources in Tibet/China, flows through India and Pakistan). It supplies irrigation, domestic water, industry, and hydropower.

Indus Basin Irrigation System (IBIS): one of the largest contiguous irrigation networks in the world — network of barrages, headworks, canals (e.g., Guddu, Sukkur, Kotri), link canals, distributaries. Has enabled high cereal yields but also caused salinization and ecological changes.

Major dams & hydroelectric projects: Tarbela (Indus; multi-phase expansions; large storage and power generation), Mangla (Jhelum) — multifunctional (irrigation, power, some flood moderation). Tarbela's storage and extensions have major roles in seasonal flow regulation but sedimentation (siltation) reduces storage over time.

Water issues: seasonal mismatch (monsoon flows concentrated in summer), upstream water management (regional geopolitics), groundwater depletion (widespread in Punjab due to tube wells, recently accelerated by cheap solar pumping), irrigation inefficiencies and inequitable distribution.



3) Climate: controls, seasons & spatial variation

Controls: latitude (subtropical position), altitude (cooling with height), proximity to sea, relief (orographic rainfall), monsoon winds and western disturbances. PMD is the national agency responsible for forecasts and monsoon advisories.

Seasons & weather systems:

- **Pre-monsoon (May–June)**: heating, thunderstorms in some areas; dust storms in plains.
- **Summer monsoon (July–September)**: south-westerly moist winds from Arabian Sea/Bay of Bengal bring most of the annual rainfall to Punjab, Sindh (variable), and northern mountains. Intense episodic rainfall events, cloudbursts and high river flows occur.
- **Post-monsoon & winter (Oct–Feb)**: retreating monsoon; **western disturbances** (mid-latitude westerly troughs) bring winter precipitation to NW Pakistan and northern mountains (snow and rain).

Spatial patterns: mountains = heavy precipitation (orographic); Indus plain = seasonal monsoon rain; Balochistan & parts of Sindh = arid; coastal areas milder. (Climate maps above).

4) Hazards — floods, droughts, storms (detailed)

4.1 Floods (types, causes, impacts, management)

Types & causes

Riverine (fluvial) floods: prolonged heavy monsoon rains across catchments increase river discharge over weeks;

large sections of Indus/tributaries inundated. 2010 & 2022 examples: huge populations affected, large economic loss.

Flash floods: short, intense rainfall (cloudburst) in steep mountainous catchments causing rapid runoff; destructive locally (debris flows/landslides). Recent cloudburst events (2025) have produced deadly flash floods.

Glacial Lake Outburst Floods (GLOFs): sudden breach of moraine-dammed glacial lakes releases huge flood waves down valleys — a growing risk as glaciers destabilize with warming. ICIMOD/UNDP projects work on GLOF early warning and risk reduction.

Urban flooding: poor drainage, impermeable surfaces, clogged drains (e.g., large cities like Karachi, Lahore) — combined with intense rainfall cause city inundation.

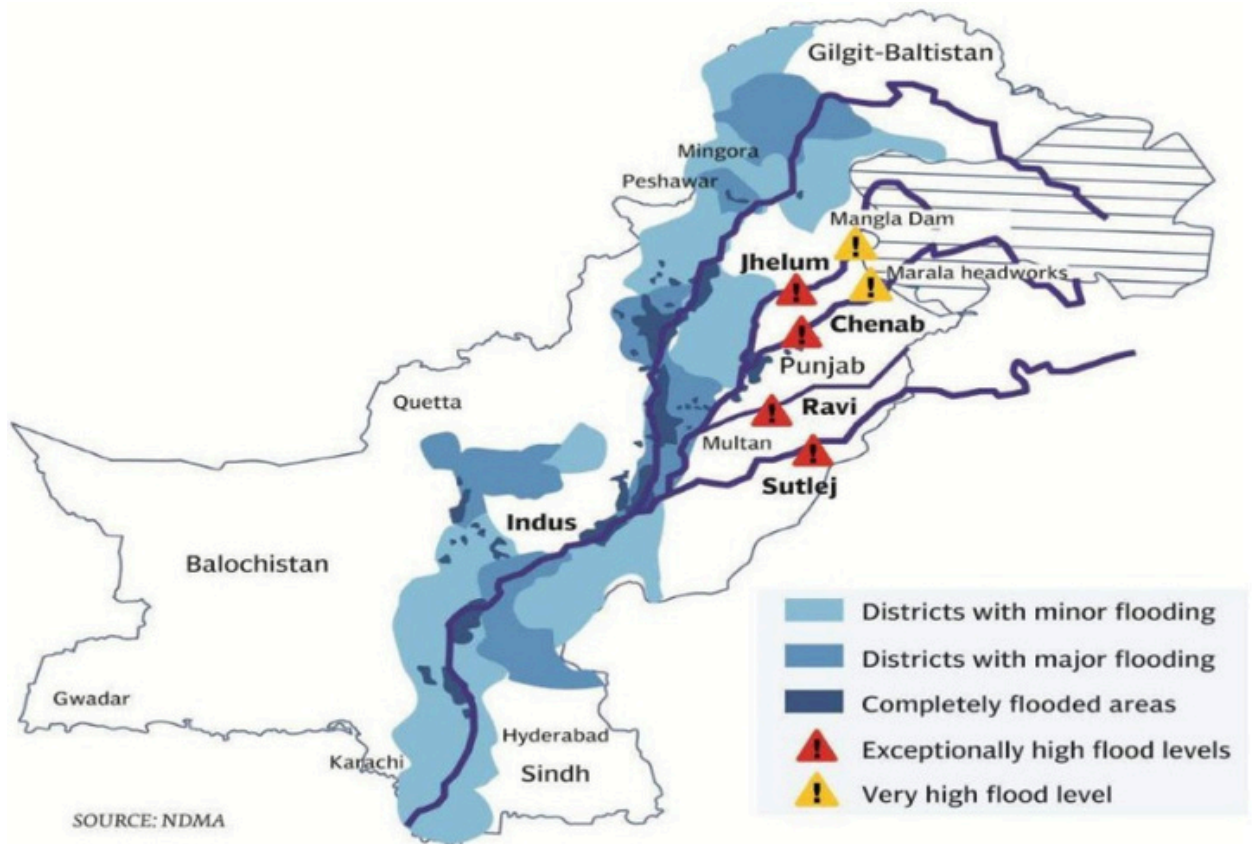
Impacts

- Loss of life, food crops, livestock; displacement; damage to roads/bridges, health crises (water-borne disease), school closures; long-term economic losses (e.g., 2022 PDNA: ~33 million affected).

Management & mitigation

- Structural: levees, embankments, retention basins, reservoir management (Tarbela/Mangla), drainage improvements in cities.

Non-structural: forecasting, early warning (PMD + NDMA/PDMA), community preparedness, land-use zoning to avoid floodplains. Lessons from 2010 → strengthened institutions, but gaps remain.



4.2 Droughts (types, drivers, impacts, adaptation)

Types & drivers

- **Meteorological drought:** prolonged below-average precipitation (weak monsoon or seasonal failure).
- **Agricultural drought:** soil moisture deficits affecting crops.

Hydrological drought: reduced river/reservoir flows and groundwater levels.

Pakistan has seen drought episodes across Sindh, Balochistan and parts of Punjab — aggravated by reduced seasonal rainfall and rising temperatures. PMD's NDMC monitors drought and issues bulletins (regular drought alerts).

Impacts

- Crop failures, livestock mortality, food insecurity, migration, reduced hydropower & irrigation availability. FAO / NDMA reported major crop losses during recent drought spells.

Adaptation & response

Drought-resilient cropping, water-saving irrigation (drip, scheduling), groundwater regulation (well mapping), rainwater harvesting, drought contingency planning and cash/food assistance.

4.3 Storms, cyclones & cloudbursts

Tropical cyclones (Arabian Sea): less frequent than Bay of Bengal cyclones but can be strong and cause coastal storm surge, heavy coastal rain and damage to ports/coastal

settlements (PMD issues marine and coastal warnings, e.g., recent Cyclone advisories). Storm paths vary; post-monsoon seasons (pre & post) produce most events.

Cloudbursts: extremely intense, localized rainfall (e.g., >100 mm/hr in a small area) causing flash floods in mountainous valleys — increasingly reported in recent years and difficult to forecast with long lead times. Recent deadly cloudbursts in NW Pakistan underline the hazard.

- **Local severe storms:** convective thunderstorms, hail and dust storms (affect crops and transport).

5) Why hazards are increasing (short analysis)

Climate change: higher temperatures intensify atmospheric moisture; monsoon becomes more variable with more extreme downpours interspersed by dry spells → greater flood/drought contrast. Scientific attribution studies link increasing extremes to warming.

Land-use change & poor watershed management
(deforestation, overgrazing) increases runoff and erosion.

Infrastructure & governance gaps: settlement in floodplains, weak enforcement of zoning, inadequate urban drainage.

6) Mitigation, adaptation & sustainable solutions (exam-ready evaluation points)

Structural: reservoirs, restoration of natural floodplains, river dredging (cautious), strengthened embankments, improved city drainage. (Note trade-offs: embankments may transfer flood risk downstream; reservoirs trap sediment).

Non-structural: early warning systems (PMD + NDMA + community systems), land-use planning, insurance, disaster risk reduction education. NDMA & international partners (World Bank, UNDP, GCF) fund GLOF and flood resilience projects.

Water sector reforms: water-use efficiency in agriculture (highest water consumer), regulation of groundwater (avoid over-extraction), conjunctive use of surface & groundwater, better reservoir sediment management.

8) Sample exam-style questions & model answers

Marking notes: for Cambridge IGCSE, short answers (a) = 1–3 marks, explain (b/c) = 4–6 marks, evaluate (d) = 8–12 marks depending on depth.

Q1 (2 marks) — Define or name

a) Name two major mountain ranges in northern Pakistan.

Answer: Karakoram and Himalaya. (1 mark each)

Q2 (4 marks) — Short explanation

Explain two reasons why the Indus Plain is Pakistan's main agricultural region.

Model answer (4):

- It has deep, fertile **alluvial soils** deposited by the Indus and tributaries (1).
 - A large **irrigation network** (canals, barrages) provides reliable water for crops (1).
 - Flat relief enables mechanised farming and dense settlement (1).
 - Proximity to markets and transport (roads/rail) helps distribution (1).
-

Q3 (6 marks) — Short data/causal question

Explain three causes of the severe 2022 floods in Pakistan.

Model answer (6):

- **Above-average monsoon rainfall** leading to extreme runoff across the Indus basin (2).
 - **Intense cloudburst/convective events** in mountainous catchments producing flash floods (2).
 - **High glacier melt and GLOF risk** in the north adding to downstream flows and sediment (2).
-

Q4 (8 marks) — Discussion / evaluation

“Dams are the best solution for flood control in Pakistan.” Discuss.
(use structured evaluation)

Model answer (8) — structure: 2–3 paragraphs pros & cons + conclusion.

Arguments for: dams (Tarbela, Mangla) store peak flows, generate hydropower, support irrigation and can reduce flood peaks if managed well (3).

Arguments against / limitations: large dams trap sediment (reducing long-term storage), can fail/overflow in extreme events, displace people, are expensive, and provide only partial flood protection (3). Sediment management and transboundary water politics complicate operations.

Conclusion: dams are an important tool **but not a standalone solution**; a combination of structural (dams, levees), non-structural (early warning, watershed

management), and adaptation strategies is needed (2).

Q5 (10 marks) — Hazard case study style (long answer)

Describe the causes, immediate impacts and two long-term responses to severe monsoon floods in Pakistan. (10 marks)

Model answer (guide) — marks allocated across subparts: causes (3), immediate impacts (3), two long-term responses (4).

Causes (3): intense monsoon rains, saturated catchments, cloudbursts/flash floods, glacier melt and poor land-use (1 each up to 3).

Immediate impacts (3): deaths & injuries; displacement and loss of homes; crop & livestock destruction and disruption of transport/infrastructure (1 each).

Long-term responses (4): (a) Rebuilding resilient infrastructure and restoring floodplains/ mangroves; (b) strengthening early warning systems, community preparedness and risk financing (cash grants, insurance). Mention NDMA/PDMA role and international PDNA findings to justify (2 each).

Chapter 3

Water Supply

Candidates should be able to:
identify on a map the Mangla, Tarbela and Warsak dams, and name two examples of barrages
understand the importance of water as a resource; understand how supplies for agricultural, industrial and domestic purposes are obtained, maintained and controlled as well as used; understand the reasons for, and consequences of, the Indus Water Treaty
explain and evaluate the causes of and solutions to the problems of water supply (including pollution)
understand the value of water as a resource for development
explain and evaluate how water supply issues can lead to conflict.

1. Identification of Dams and Barrages in Pakistan

Major Dams:

○ Mangla Dam:

- Located on the Jhelum River in Mirpur District, Azad Jammu and Kashmir.
- Completed in 1967, it is the second-largest dam in Pakistan in terms of storage capacity.
- Constructed primarily for irrigation water storage and hydroelectric power generation.
- Has a reservoir capacity of approximately 7.25 million acre-feet (MAF).
- Plays a key role in controlling water flow from the Jhelum and supporting the agricultural economy of Punjab.

○ Tarbela Dam:

- Built on the Indus River, near Haripur District, Khyber Pakhtunkhwa.
- Completed in 1976, it is one of the largest earth-filled dams in the world.
- Its reservoir, Tarbela Lake, stores around 9.68 MAF of water.
- Provides irrigation water, hydropower (installed capacity over 4,800 MW), and flood control.
- A cornerstone of Pakistan's water and power infrastructure.

○ Warsak Dam:

- Located on the Kabul River, northwest of Peshawar in Khyber Pakhtunkhwa.

- Completed in 1960 with Canadian assistance.
- Primarily used for hydropower generation and irrigation regulation.
- Its reservoir also helps in flood mitigation during monsoon periods.

Examples of Barrages:

- Sukkur Barrage: Built on the Indus River in Sindh (1932), it diverts water into seven major canals, irrigating millions of hectares in Sindh.
- Guddu Barrage: Located between Kashmore and Jacobabad, completed in 1962, it controls the distribution of water to northern Sindh and southern Punjab.
- (Others include Kotri Barrage and Chashma Barrage — often referenced for exam mapping questions.)

2. Importance of Water as a Resource

Agricultural Importance:

- Agriculture accounts for approximately 20% of Pakistan's GDP and employs nearly 40% of the labor force.
- The Indus River System forms the backbone of the Indus Basin Irrigation System (IBIS)—one of the world's largest contiguous irrigation systems.
- Water enables crop cultivation in arid and semi-arid zones, supporting key cash crops like cotton, sugarcane, rice, and wheat.
- Water availability directly affects food security, export potential, and rural livelihoods.

Industrial Importance:

- Industries such as textiles, leather, beverages, steel, cement, and chemicals depend on water for processing, cooling, and cleaning.
- Hydropower (from Tarbela, Mangla, and Warsak) provides renewable electricity, reducing dependency on fossil fuels.

Domestic and Urban Use:

- Essential for drinking, sanitation, and daily household functions.
- Urban centers like Karachi, Lahore, and Islamabad face severe water stress due to over-extraction, leakage, and population growth.

Ecological and Environmental Value:

- Supports wetlands, fisheries, forests, and biodiversity (e.g., Indus Delta mangroves).
- Regulates microclimate and sediment transport, maintaining soil fertility and ecosystem balance.

3. Water Supply: Obtaining, Maintaining, and Control

Sources of Water Supply:

- Surface Water: Rivers, lakes, reservoirs (Tarbela, Mangla, etc.), and canals.
- Groundwater: Extracted via tube wells and dug wells, especially in Punjab and Sindh plains.
- Rainwater Harvesting: Increasingly promoted in arid regions (Balochistan, Thar Desert) to supplement scarce resources.

Maintenance and Control:

- Storage Dams and Reservoirs regulate seasonal flows and mitigate flooding.

- Canal System Management: IBIS distributes water through a complex network of link canals and distributaries.
- Irrigation Departments and Water Authorities (e.g., WAPDA, IRSA) oversee allocation and maintenance.
- Waterlogging and Salinity Control Programs (SCARP projects) aim to manage groundwater recharge and prevent soil degradation.

Challenges:

- Siltation reducing dam storage capacity (notably in Tarbela and Mangla).
- Aging infrastructure leading to losses through seepage and leakage.
- Over-reliance on groundwater causing depletion and contamination (especially in Lahore Basin).

4. The Indus Water Treaty: Reasons and Consequences

Background:

- Signed in 1960 between India and Pakistan, brokered by the World Bank.
- Aimed to resolve water-sharing disputes following Partition (1947), which left headworks of key rivers in Indian territory.

Provisions:

- Eastern Rivers (Ravi, Beas, Sutlej): Allocated to India.
- Western Rivers (Indus, Jhelum, Chenab): Allocated to Pakistan, though India allowed limited non-consumptive use (e.g., hydropower, transport).

Reasons:

- Avoid conflict and ensure equitable and predictable distribution of Indus Basin waters.
- Facilitate Pakistan's development of alternative irrigation infrastructure (financed through Indus Basin Development Fund).

Consequences:

- Enabled Pakistan to construct Mangla, Tarbela, and link canals, securing water independence.
- Reduced inter-state water conflict but remains a geopolitical flashpoint, especially with India's hydro projects (e.g., Kishanganga, Baglihar).
- Provided institutional frameworks like Permanent Indus Commission for continuous dialogue.

5. Causes and Solutions to Water Supply Problems (Including Pollution)

Causes:

- Rapid Population Growth: Rising domestic and agricultural demand.
- Climate Change: Irregular rainfall, glacial retreat, and changing river flows.
- Poor Management: Leakage, inefficient irrigation (flood irrigation wastes up to 60% of water).
- Pollution: Industrial effluents, agricultural runoff (pesticides, fertilizers), and untreated sewage contaminating rivers and groundwater.
- Deforestation and Siltation: Increasing runoff, reducing reservoir capacities.
- Inter-provincial disputes over water distribution (Punjab vs. Sindh).

Solutions:

- Water Conservation Techniques: Drip and sprinkler irrigation, laser leveling, crop diversification to less water-intensive varieties.
 - Pollution Control: Enforcement of effluent treatment regulations; establishment of wastewater treatment plants.
 - Infrastructure Rehabilitation: Desilting canals, repairing leakage-prone sections.
 - Awareness and Education: Promoting water-saving habits and efficient domestic use.
 - Integrated Water Resource Management (IWRM): Coordinating across sectors and provinces for sustainable allocation.
 - Afforestation and Watershed Management: To reduce soil erosion and enhance groundwater recharge.
-

6. The Value of Water as a Resource for Development

Economic Development:

- Water underpins agricultural productivity, energy generation, and industrial growth, all of which contribute to GDP and exports.
- Hydropower provides a low-cost, renewable energy source, critical for energy security.

Industrial Operations:

- Water is essential in almost every industrial process — used for cooling, cleaning, processing, and as a raw material in manufacturing.
- Industries such as textiles, sugar, cement, beverages, tanneries, paper, and fertilizers are heavily water-dependent.

- Ensures consistent production and quality control, reducing downtime and waste.

Hydropower and Energy Security:

- Dams like Tarbela and Mangla supply low-cost hydroelectric power, which fuels factories and industrial estates.
- Cheap and renewable energy helps reduce production costs, encourages industrial expansion, and attracts foreign investment.

Employment and Economic Stability:

- Industrial growth supported by stable water supplies creates jobs, promotes urbanization, and improves livelihoods.
- Provides indirect employment in transport, logistics, and services linked to industrial production.

Social Development:

Access to Clean Water and Public Health:

- Safe drinking water and adequate sanitation prevent waterborne diseases (e.g., cholera, typhoid, diarrhea), improving public health outcomes.
- A healthy population forms the basis of a productive labor force, essential for sustained economic growth.

Healthy Work Environment:

- Workers who have access to clean water, sanitation, and hygiene (WASH) facilities in households and workplaces exhibit better attendance, concentration, and productivity.

- Reduced disease burden leads to lower absenteeism and higher efficiency, directly enhancing economic performance.

Urban Development and Quality of Life:

- Adequate domestic water supply enables urban growth, supports housing development, and improves living standards.
- Clean water access is tied to human capital development — children can attend school regularly, adults can work effectively, and healthcare burdens are reduced.

Social Stability and Gender Empowerment:

- In rural areas, improved water access reduces the time women and children spend fetching water, allowing greater participation in education and economic activities.
 - This strengthens social equity and contributes to inclusive development.

Regional Development:

- Water infrastructure projects (e.g., new dams like Diamer-Bhasha) stimulate local employment, resettlement planning, and rural modernization.

7. Water Supply Issues and Conflict

Domestic (Internal) Conflicts:

Inter-provincial tensions over distribution under IRSA allocations, especially between Punjab and Sindh.

The provincial dispute over Khanpur Dam arises between Khyber Pakhtunkhwa (KPK) and Punjab regarding control and distribution of water from the dam.

Although the dam is physically located in KPK (Haripur District) and fed by the Haro River, most of its stored water is supplied to Islamabad and Rawalpindi, both situated in the Punjab region and the Federal Capital Territory.

KPK's local communities and authorities argue that they receive insufficient water for local irrigation and domestic use, despite the dam being within their province and affecting their environment and livelihoods.

They claim that the federal and Punjab authorities benefit disproportionately, while KPK bears the social and ecological costs of the dam's presence, such as reduced river flow, land submergence, and limited agricultural water availability.

This has led to repeated complaints and protests from residents of Haripur District, demanding greater water allocation, compensation, or royalty payments for the use of their province's water resources.

Punjab and federal authorities, on the other hand, maintain that Khanpur Dam was constructed as a national-level project under WAPDA, meant to serve multi-provincial and federal interests, especially ensuring urban water supply for the twin cities (Rawalpindi–Islamabad).

The dispute reflects a broader issue of inter-provincial inequity and the political sensitivity of water management in Pakistan, where resource location and benefit distribution often do not align, causing tensions over fairness and provincial rights.

Disputes arise from perceptions of unfair control of canal headworks and shortages during dry seasons.

International Conflicts:

- Tensions with India over river control projects on western rivers, viewed by Pakistan as treaty violations.
- The Kishanganga Dam and Baglihar Hydroelectric Project disputes are notable examples of diplomatic confrontation.

Baglihar Dam [A Case Study]

- Pakistan's Objections:
 - Filed a formal complaint in 2005 with the World Bank (the treaty's guarantor).
 - Claimed that India's design violated the Treaty by including:
 - Excessive storage (pondage), allowing India to manipulate river flow.
 - Low-level outlets (gated spillways) that could be used to control or stop water flow to Pakistan during critical crop seasons.
 - A dam height greater than permitted under run-of-the-river criteria.
 - Feared that India could reduce or delay water releases, particularly during Rabi crop seasons, negatively affecting Pakistan's agriculture.
- India's Position:
 - Argued that the project complied fully with the IWT and that the dam's design features were essential for the safety and efficiency of hydroelectric power generation.
 - Claimed the pondage was within permissible limits and that gated spillways were required for sediment control and operational flexibility in the mountainous terrain.
- The World Bank appointed a Neutral Expert, Professor Raymond Lafitte, to resolve the dispute under Article IX of the Indus Water Treaty.
- Findings (2007):
 - The Neutral Expert upheld India's right to construct the dam.

- However, modifications were ordered to ensure compliance:
 - The maximum height of the dam's spillway gates was to be reduced.
 - The pondage volume was to be slightly lowered.
- The ruling validated India's interpretation of certain technical aspects, strengthening India's position for future hydroelectric projects on western rivers.

Socio-economic Conflicts:

- Urban vs. rural competition for water access; urban water scarcity leads to inequality and unrest.
- Industrial vs. agricultural use conflicts arise due to competing priorities during shortages.

Mitigation Measures:

- Strengthening Indus Water Treaty mechanisms, regular dialogue through the Permanent Indus Commission.
 - Promoting water diplomacy, joint hydrological studies, and shared data systems.
 - Domestic water governance reforms to ensure transparent, equitable distribution.
-

Sample Questions

Q1.

What is the main purpose of the Baglihar Dam?

Answer:

Its main purpose is hydroelectric power generation, using a run-of-the-river design to produce electricity for northern India

Q2.

Explain why the Baglihar Dam caused conflict between India and Pakistan.

Answer (4 marks):

The Baglihar Dam was built by India on the Chenab River, one of the western rivers allocated to Pakistan under the Indus Water Treaty.

Pakistan claimed that the dam's design violated the Treaty because it had excessive storage capacity and low-level gated outlets, allowing India to regulate or stop river flow toward Pakistan.

Q3.

Name three major dams in Pakistan.

Answer:

Tarbela Dam, Mangla Dam, and Warsak Dam.

Q4.

State two examples of barrages in Pakistan.

Answer:

Examples include the Sukkur Barrage and the Guddu Barrage.

Q5.

Explain why water is so important to Pakistan's economy. [4]

Answer:

Pakistan's economy is agriculture-based, and most farms depend on irrigation from the Indus River System.

Water also supports hydropower generation, providing cheap electricity for industries.

Many industrial processes (like textile and sugar production) require water.

Furthermore, water ensures food security, employment, and export earnings, making it vital for overall development.

Q6.

Explain the main reasons for water shortages in Pakistan. [4]

Answer:

Rapid population growth increases demand for domestic and agricultural water.

Climate change and irregular rainfall reduce river and groundwater recharge.

Siltation in dams like Tarbela reduces storage capacity.

Poor management and canal leakages waste large volumes of water.

Over-extraction of groundwater has caused depletion and contamination in many areas.

- 1 (a) (i) Study Fig. 1.1, a map showing southern Pakistan and surrounding countries.

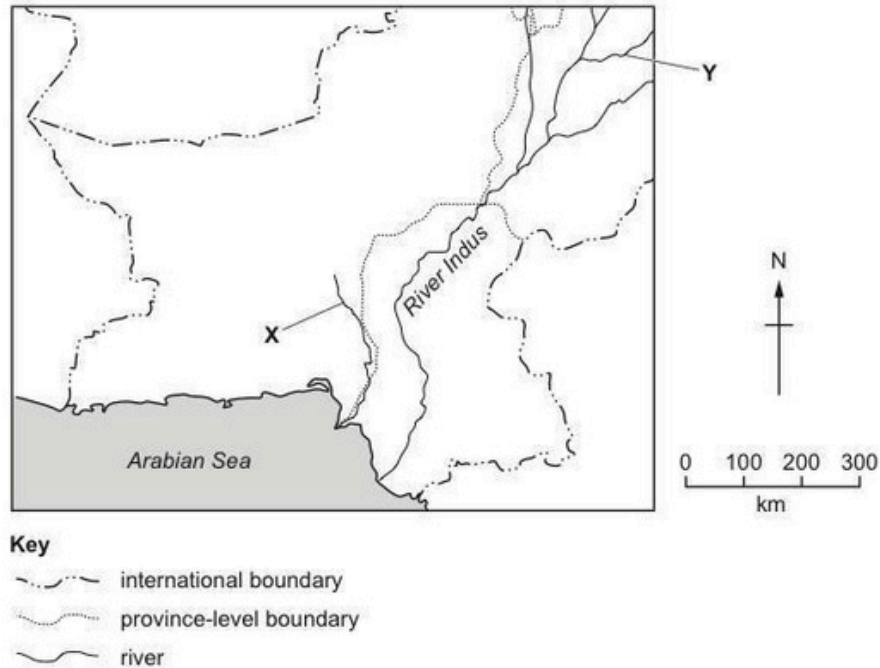


Fig. 1.1

On Fig. 1.1 label the following: Afghanistan, India, Iran. You should write the name in the correct location on the map. [3]

- (ii) Add a dot and the letter **K** onto Fig. 1.1 to show the location of Karachi. [1]
- (iii) Using Fig. 1.1 **only**, what is the approximate length of Pakistan's coastline? **Circle** the correct answer. [1]
- 500km 1000km 1500km
- (iv) Name the rivers labelled **X** and **Y** on Fig. 1.1.

X

Y [2]

(b) Suggest **four** ways in which rivers are important to Pakistan.

- 1
 - 2
 - 3
 - 4
- [4]

(c) (i) Study Fig. 1.2 (Insert), a photograph showing part of the Karakoram range.

Describe the **natural** features of the landscape shown.

-
-
-
-
-
-
-
- [4]

(ii) Explain **two** ways in which the natural topography shown in Fig. 1.2 influences human activities. You should develop your answer.

- 1
 - 2
- [4]

Water pollution is the biggest threat to the continued provision of water supplies.

A shortage of dams is the biggest threat to the continued provision of water supplies.

Which view do you agree with more? Give reasons to support your answer and refer to examples you have studied. You should consider view A **and** view B in your answer.

[6]

[Total: 25]

Chapter 4

Forests

Candidates should be able to:
understand the different types of forest and identify, on a map, their main locations
understand the physical factors that control the distribution of the different types of forest, and the human factors which have reduced their extent
understand the reasons for: –the development of plantations in the Indus Plain –afforestation on mountain slopes and plateaux
understand the value of forests as a resource for development, and the importance of their sustainability
explain the effects of deforestation, such as soil erosion, silting and flooding evaluate possible solutions to the problems caused by deforestation.

1. Overview

Forests in Pakistan cover around 4–5% of the total land area, which is below the recommended 20–25% for ecological balance.

They play a vital role in Pakistan's economy, environment, and rural livelihoods.

Forest types vary due to differences in climate, rainfall, altitude, and soil.

2. Types of Forests, Locations, Species, Uses, and Importance

A. Alpine Forests (Sub-Alpine and Alpine Scrub)

Location:

Found in the Northern high mountains — Gilgit-Baltistan, Skardu, Hunza, upper Kaghan, Chitral, and Neelum Valley.

Found above 3,000 meters altitude.

Climate:

Very cold, long snowy winters, and short cool summers.

Precipitation mainly as snow.

Main Species:

Birch, Juniper, Willow, Dwarf shrubs, and Alpine herbs.

Uses:

Grazing: Summer pastures for yaks, sheep, and goats.

Fuelwood: Small shrubs used as limited fuel source.

Water Catchment: Maintain glaciers and snowfields which feed rivers.

Tourism: Scenic beauty attracts trekkers and tourists.

Importance:

Prevent glacial erosion and landslides.

Preserve biodiversity in extreme climates.

Support pastoral livelihoods.

Critical for hydrological balance and sustaining Indus River flow.

B. Coniferous (Temperate) Forests

Location:

Found between 1,000–3,000 meters altitude in Murree, Galliyat, Swat, Dir, Chitral, and Azad Kashmir.

Climate:

Cool and moist with heavy rainfall and snowfall.

Main Species:

Deodar, Blue Pine, Chir Pine, Fir, Spruce.

Uses:

Timber: High-quality wood for construction, furniture, and railway sleepers.

Paper and Pulp: Used in paper industries.

Resin and Turpentine: Extracted from pine trees for varnish and medicinal use.

Tourism: Beautiful landscapes attract visitors (Murree, Nathiagali, Swat).

Importance:

Provide valuable export-quality timber.

Protect mountain soils from erosion and landslides.

Act as water catchments for rivers feeding the plains.

Climate regulation in northern regions.

C. Subtropical Broad-Leaved Evergreen Forests

Location:

Found in foothills of the Himalayas, Salt Range, and Potwar Plateau — particularly in Hazara, Attock, and Rawalpindi districts.

Climate:

Moderate temperatures, 500–1,000 mm rainfall.

Main Species:

Wild Olive, Phulai, Sanatha, Kachnar, and Ber.

Uses:

Fuelwood: Main energy source for nearby villages.

Fodder and Grazing: Support livestock.

Timber: Used locally for furniture and agricultural tools.

Fruit-bearing trees: Wild olive and ber provide edible fruits.

Importance:

Prevent erosion on foothills and slopes.

Help conserve water and maintain moisture in soils.

Provide livelihood to rural communities.

Contribute to micro-climate regulation in semi-arid areas.

D. Subtropical Pine Forests

Location:

Mid-altitude ranges (900–1,700 m) — in Murree, Dir, Swat, Abbottabad, and Balochistan (Ziarat region).

Main Species:

Chir Pine (*Pinus roxburghii*).

Uses:

Timber: Used for construction and poles.

Resin extraction: For paints, varnishes, and chemicals.

Firewood: Readily available source in rural highlands.

Tourism: Add scenic beauty to hill resorts.

Importance:

Protect mountain slopes from erosion and landslides.

Maintain clean air and cool climate in upland areas.

Provide income from resin and forest-based industries.

Serve as watershed areas for rivers like Jhelum and Swat.

E. Tropical Thorn (Scrub) Forests

Location:

Found in Potwar Plateau, Salt Range, western Punjab, southern Khyber Pakhtunkhwa, and parts of Sindh and Balochistan.

Climate:

Hot, dry, low rainfall (under 500 mm annually).

Main Species:

Kikar (*Acacia nilotica*), Phulai (*Acacia modesta*), Ber, Capparis, Wild Olive.

Uses:

Fuelwood: Major source for domestic energy.

Grazing land: For goats and sheep.

Timber: Used for agricultural tools and posts.

Honey production: Bees thrive in these dry forests.

Importance:

Prevent desertification and wind erosion.

Protect agricultural lands from dust storms.

Provide subsistence resources for poor rural populations.

Act as buffer zones between deserts and farmland.

F. Riverine Forests

Location:

Along River Indus and its tributaries, mainly in Sindh and southern Punjab — near Sukkur, Dadu, and Rahim Yar Khan.

Climate:

Semi-arid, dependent on seasonal floods and river moisture.

Main Species:

Shisham, Babul (*Acacia arabica*), Tamarix, Poplar, and Jhand.

Uses:

Timber: For furniture, boats, and agricultural implements.

Fuelwood: Abundant source for local communities.

Grazing: Seasonal pastures for livestock.

Flood protection: Trees reduce water velocity.

Importance:

Bind riverbanks, preventing erosion and flooding.

Supply economic wood for industries and households.

Maintain biodiversity and soil fertility along floodplains.

Act as natural barriers against siltation and riverbank collapse.

G. Irrigated Plantations

Location:

Artificially planted forests in Punjab and Sindh, especially Changa Manga, Chichawatni, Kundian, and Tando Muhammad Khan.

Climate:

Hot and dry; irrigated through canal systems.

Main Species:

Shisham, Kikar, Eucalyptus, Mulberry, Poplar.

Uses:

Timber and Fuelwood: Regular supply for industries and households.

Shade Trees: Along roads and canals.

Windbreaks and Shelterbelts: Protect crops from strong winds.

Paper and Plywood: Used in manufacturing industries.

Importance:

Reduce pressure on natural forests.

Improve micro-climate and air quality.

Provide employment and industrial raw material.

Help reclaim barren land and control salinity.

H. Mangrove Forests

Location:

Found along Indus Delta and Karachi coast — Ketī Bandar, Korangi, Sandspit, Sonmiani, and Pasni.

Climate:

Coastal saline environment; influenced by tides.

Main Species:

Avicennia marina (Grey Mangrove).

Uses:

Fish and Shrimp Breeding Grounds: Crucial for fishing industry.

Fuelwood: Used locally.

Timber: For small boats and fencing.

Protection: Against sea storms and tidal erosion.

Importance:

Protect coastal regions from cyclones, floods, and erosion.

Serve as nurseries for marine life.

Support fishermen livelihoods.

Help in carbon sequestration and climate regulation.

3. Factors Affecting Forest Distribution

Physical Factors

Rainfall: High rainfall supports dense forests; dry areas have scrub.

Temperature: Cold areas favor conifers; hot areas have thorny vegetation.

Altitude: Determines type — alpine at top, coniferous at mid-level, subtropical below.

Soil Fertility: Alluvial soils favor irrigated and riverine forests.

Water Availability: Rivers and rainfall influence vegetation density.

Human Factors

Deforestation: For agriculture, housing, timber, and fuel.

Overgrazing: Prevents regeneration.

Urban Expansion: Cuts down forests near cities.

Illegal Logging: Destroys valuable trees.

Dams/Barrages: Reduce flooding that sustains riverine forests.

4. Reasons for Afforestation and Plantations

Indus Plain:

Meet industrial timber demand.

Reclaim barren and saline soils.

Provide employment and income.

Improve environmental conditions.

Reduce pressure on natural forests in northern regions.

Mountain Slopes and Plateaux:

Prevent landslides, erosion, and siltation.

Maintain water flow in rivers.

Provide timber and fuelwood sustainably.

Enhance tourism and natural beauty.

5. Importance and Value of Forests (Overall)

Economic Importance:

Source of timber, fuelwood, paper, resin, and fruits.

Employment in logging, carpentry, and tourism.

Support livestock and local economies.

Environmental Importance:

Prevent erosion, floods, and silting.

Maintain water cycle and rainfall.

Absorb carbon dioxide, reducing climate change.

Protect coastal areas from storms (mangroves).

Social Importance:

Provide shelter, food, and income to rural people.

Promote recreation and tourism.

Cultural and aesthetic value.

6. Effects of Deforestation

Soil erosion and loss of fertility.

Increased floods and siltation.

Climate change and desertification.

Loss of biodiversity and wildlife habitat.

Reduction in fuelwood and timber supply.

Economic loss to forest industries.

7. Solutions to Deforestation

Afforestation and Reforestation.

Sustainable forest management.

Community involvement in forest protection.

Alternative fuels (LPG, biogas).

Strict enforcement of forest laws.

Environmental education and awareness.

Research and improved forest technology.

Past paper questions

Name two main species found in Pakistan's coniferous forests.

Sample Answer:

Deodar

Chir Pine

(1 mark each = 2 marks)

State two problems caused by deforestation in Pakistan.

Sample Answer:

Soil erosion and loss of fertile topsoil.

Increased flooding and silting of rivers.

Describe two physical factors that affect the distribution of forests in Pakistan.

Sample Answer:

1. Rainfall: Areas with high rainfall such as the northern mountains support dense coniferous forests, while dry regions like southern Punjab have thorn or scrub forests.

2. Altitude: At high altitudes in northern areas, cold temperatures and snow lead to alpine forests, whereas lower slopes support subtropical and pine forests.

(2 marks per point = 4 marks)

Explain two reasons for the development of irrigated plantations in the Indus Plain.

Sample Answer:

1. Low natural forest cover: The Indus Plain receives little rainfall, so artificial irrigation allows trees like Shisham and Kikar to grow where natural forests cannot.
2. Economic demand: There is a high need for timber and fuelwood for industry and domestic use, so plantations were created to supply these needs.

(2 marks per well-explained reason = 4 marks)

Describe two uses of mangrove forests.

Sample Answer:

1. Coastal protection: Mangroves act as a natural barrier against sea erosion, cyclones, and tidal waves.
2. Fish breeding grounds: They provide habitat for fish, shrimp, and other marine life, supporting the local fishing industry.

- 4 Study Fig. 4.1, a pie graph showing the percentage share of Pakistan's total forest cover by province-level area.

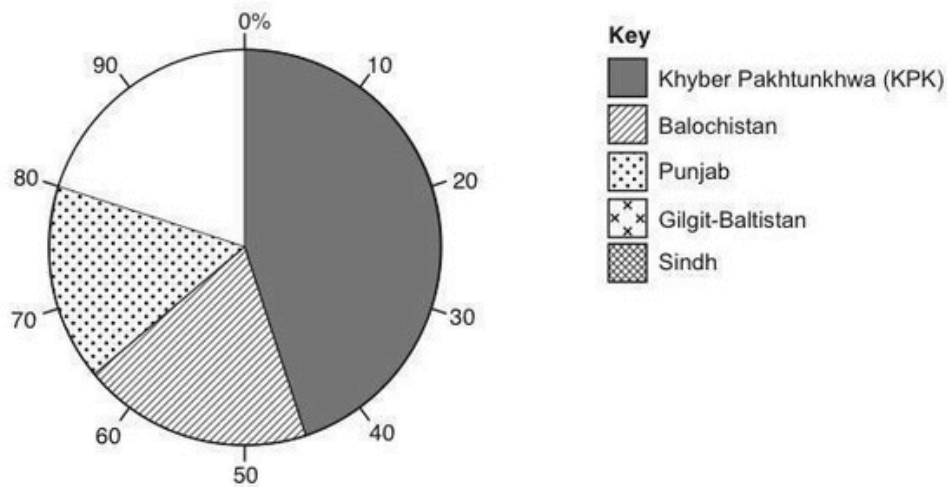


Fig. 4.1

- (a) (i) **Complete** the pie graph in Fig. 4.1 to show the percentage of total forest cover found in Gilgit-Baltistan and Sindh. Use the information below and the key provided:

province-level area	percentage (%)
Gilgit-Baltistan	11
Sindh	9

[3]

- (ii) **Complete** the passage below about reasons for the variations in the percentage share of forest cover shown in Fig. 4.1. Choose the correct words from the list and place them in the spaces provided.

KPK has the largest percentage share of forest cover in Pakistan because the is more suitable for growing trees. There are fewer trees in Punjab because the land is needed for Some areas may have suffered more from than others.

afforestation altitude climate
cultivation deforestation recreation

[3]

(b) (i) State **three** functions of forests in Pakistan.

- 1
- 2
- 3

[3]

(ii) State **one** difference between productive forests and protection forests.

productive forests

.....

protection forests

.....

[2]

(iii) Study Fig. 4.2, a diagram showing how altitude affects vegetation type.

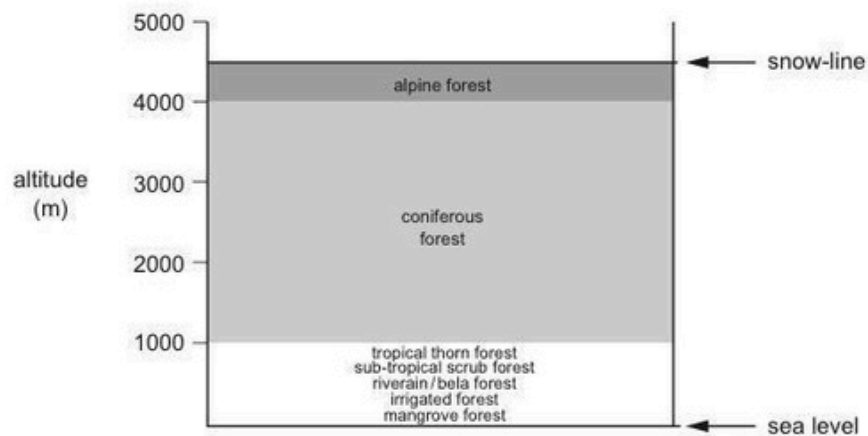


Fig. 4.2

Using Fig. 4.2 and your own knowledge, suggest how altitude affects the type and amount of vegetation in Pakistan.

-
-
-
-
-
-
-
-
-
-

[4]

- To what extent can initiatives on forests encourage further sustainable development in Pakistan? Give reasons to support your **judgement** and refer to examples you have studied. You should consider **different** points of view in your answer.

[6]

[Total: 25]

Chapter 5 – Mineral Resources of Pakistan

5.1 What are Minerals & Mining Processes

Definition & classification

- **Minerals** are naturally occurring inorganic substances in the Earth's crust from which metals or other useful materials can be extracted.

Categories:

1. **Metallic minerals** (iron, copper, chromite etc.)
2. **Non-metallic minerals** (rock salt, gypsum, limestone, marble etc.)
3. **Minerals used as energy / fuel resources** (coal, oil, natural gas) — though technically fossil fuels, they overlap with mineral resources in syllabus.

Mining & extraction processes

- **Prospecting / exploration:** Geological surveys, remote sensing, mapping to locate mineral deposits.

Mining: open-pit or underground depending on depth & nature of deposit.

Processing / beneficiation: Crushing, grinding, washing, separating ores to increase mineral concentration.

Transportation & refining: after extraction and processing, minerals transported to refineries or industrial users.

Environmental & social concerns in mining

Land degradation, deforestation, soil erosion.

Pollution: air (dust), water (acid drainage), sound.

Displacement of communities.

Economic risks: depletion, dependence on one or few minerals.

5.2 Major Metallic Minerals

Mineral	Location(s)	Use(s)	Challenges / Notes
Iron Ore	Chiniot, Kala Pahararea, Balochistan, Kalabagh	Steel making (construction, industry)	Quality varies; mining infrastructure & transport cost high
Copper	Saindak, Reko Diq (Balochistan)	Electrical wiring, machinery, coins, alloys	Environmental concerns; political & foreign investment needed
Chromite	Muslim Bagh (Balochistan), Khetrana / Kohlu	Stainless steel, dyes, leather tanning etc.	Remoteness, lack of processing facilities locally
Gold / Silver	Small mines in Khyber Pakhtunkhwa, Balochistan, Swat / Gilgit	Jewelry, investment, electronics	Often low grade; extraction costs; illegal mining issues

MINERAL MAP OF PAKISTAN

Metallic Minerals

- Chromite
- Manganese
- Iron ore
- Copper / Gold
- Zinc-Lead

Clays

- Bentonite
- China clay
- Fire clay
- Fuller's earth

Gemstones

- ★ Emerald
- ★ Peridot
- ★ Ruby
- ★ Topaz
- ★ Tourmaline
- ★ Aquamarine

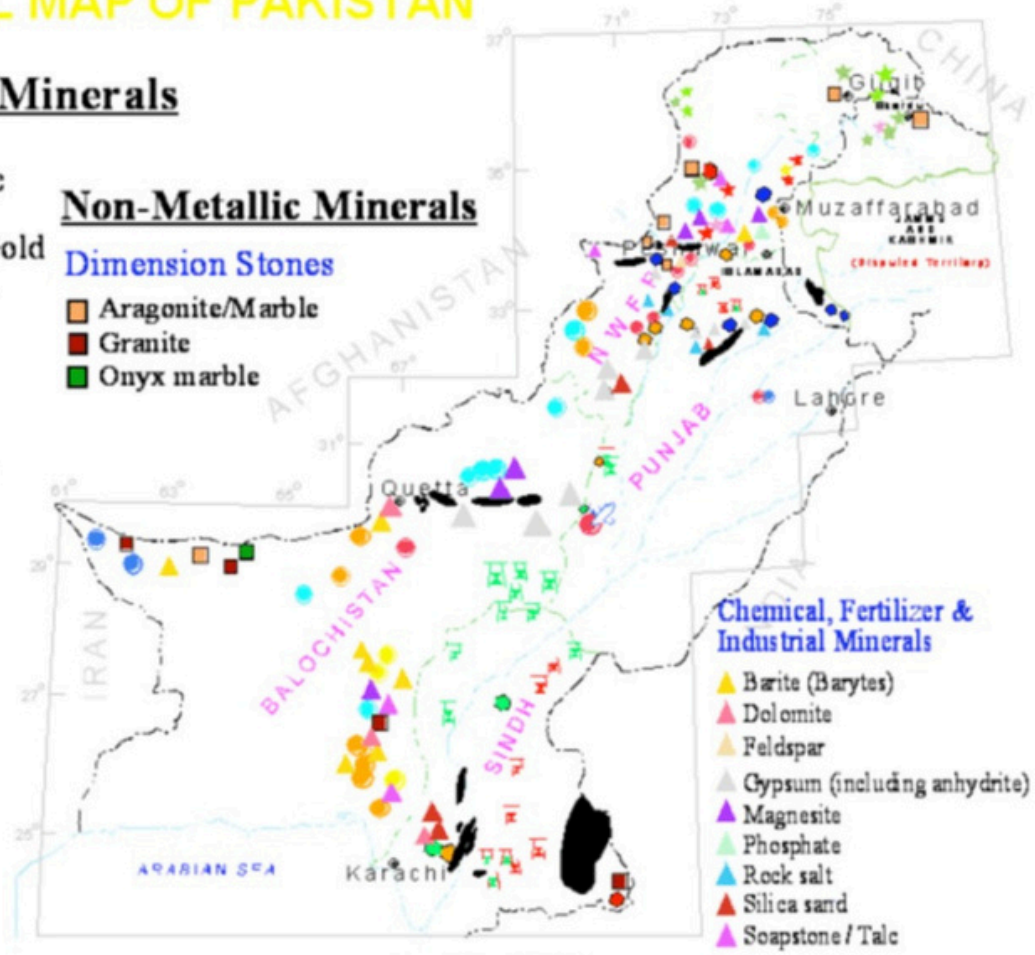
Fuels

- Coal
- ✂ Oil
- ✂ Gas
- ✂ Oil & Gas
- ✂ Uranium

Non-Metallic Minerals

Dimension Stones

- Aragonite/Marble
- Granite
- Onyx marble



5.3 Major Non-Metallic Minerals

Mineral	Location(s)	Use(s)
Rock Salt	Khewra Mines (Punjab), Karak, Salt Range	Table salt, industrial use (chemical)
Limestone	Margalla, Kala Chitta, Suleiman Range; Sindh's Makran etc.	Cement, construction aggregate, lime
Gypsum	Kohat, Dera Ismail Khan, Quetta, Mianwali	Plaster, fertilizers, construction boards Sculptures, decorative stones, flooring
Marble	Khyber Pakhtunkhwa, Swat, Balochistan (including Mohenjodaro area)	Jewelry, export revenue (e.g., tourmaline, aquamarine)
Gemstones	Hunza, Swat, Gilgit, Balochistan	



5.4 Fossil Fuel Minerals & Energy Minerals

Coal: Main deposits in Thar (Sindh), Lakhra, Duki etc. Used for thermal power, cement etc. Thar coal project is large-scale; issues: environmental impact, water usage, emissions.

Oil and Natural Gas: Key fields: Sui (Balochistan), Mari (Balochistan), Indus Basin fields. Used for domestic fuel, industry, export (LNG etc.).

Petroleum: exploration offshore (Sindh coastal areas) and onshore. Refining capacity, dependency on imports for refined products.

5.5 Mining & Industrial Processing

Refineries & smelters: E.g., copper smelter in Saindak; plants for production of rock salt, cement factories (using limestone) etc.

Infrastructure needed: power supply, transportation (roads, rail), availability of skilled labour. Often remote locations (Balochistan) make logistics difficult.

Government policy / investment: foreign investment, joint ventures (e.g., Reko Diq), incentives (tax breaks) to attract mining firms.

5.6 Sustainability, Problems & Solutions

Problems

Environmental damage: landscape disfigurement, dust, water pollution.

Depletion of high-grade ores; many mines under-invested.

Poor working conditions & artisanal/illegal mining.

Infrastructure bottlenecks (roads, energy).

Legal / regulatory issues: lack of consistent regulation, local opposition.

Solutions / sustainable practices

Rigorous environmental impact assessments (EIA) before approving new mines.

Reclamation of mined land (re-vegetation, soil restoration).

Use of cleaner / modern mining technologies.

Local employment and benefit share with communities.

Ensuring mines adhere to safety standards.

Developing downstream industries (value addition) to keep processing domestically.

5.7 Case Study: Reko Diq Copper-Gold Mine

Location: Chagai District, Balochistan.

Reserves: Among the largest undeveloped copper-gold deposits in the world.

Potential Benefits: Job creation, export earnings, infrastructure development.

Challenges: Legal disputes, environmental concerns (water scarcity, ecosystem damage), security, need for foreign investment.



5.8 Sample Exam-Style Questions & Model Answers

Q1. Define “metallic mineral” and name two metallic minerals found in Pakistan. (2)

Answer: Metallic minerals are those minerals that contain metals and are usually ores from which metals can be extracted. Two metallic minerals in Pakistan are **iron ore** and **copper**.

Q2. Explain two problems caused by coal mining in Pakistan. (4)

Answer:

1. Air pollution and greenhouse gases from burning coal, contributing to climate change and health issues.
 2. Land degradation and displacement of local communities due to mining operations and associated infrastructure.
-

Q3. Describe how non-metallic minerals are important in Pakistan's construction industry. (5)

Answer:

Non-metallic minerals like **limestone** are essential for cement production, which is the backbone of the construction industry for roads, buildings etc.

Gypsum is used in plasters and finishing work; marble is used for decorative flooring and facades. These minerals reduce the need to import construction materials, thus aiding national development. They also generate jobs in quarrying, processing and transportation.

Q4. Discuss the challenges and benefits of developing the Reko Diq mine. (6)

Model answer (6):

- **Benefits:** It offers large revenue through export of copper and gold; could create employment in Balochistan; could lead to infrastructure development (roads, electricity, water) in remote area; foreign direct investment; value addition locally.

Challenges: Environmental concerns (water use, habitat disruption); legal and political disputes between government and foreign companies; security concerns in remote Balochistan; high cost of transporting ore/products; need for skilled labour and proper regulation.

Q5. Evaluate whether Pakistan should prioritize non-metallic mineral extraction over fossil fuel minerals in its long-term mineral strategy. (10)

Model answer (structure):

Pros of prioritizing non-metallic: more abundant; less environmental damage compared to fossil fuel burning; supports construction and infrastructure growth; relatively easier to process; lower risk of depletion in near future.

Cons: non-metallic minerals often have lower profit margins; demand fluctuates; some fossil fuels are important for energy security; fossil fuels have established export markets.

Conclusion: Balanced approach needed. Pakistan should leverage non-metallic minerals for sustainable development and infrastructure, while also carefully exploiting fossil fuels with environmental safeguards.

Chapter 7

Fishing

Candidates should be able to:
describe the fishing methods used in both marine and inland waters, including fish farms
give examples of the fish caught in both marine and inland waters, and of the fish reared on fish farms
give examples of the fishing ports on both the Balochistan and Sindh coasts
describe the uses of the fish caught
explain improvements in fishing methods and processing techniques
understand the problems facing the fishing industry and evaluate the possibilities for its further development and sustainability.

1. Fishing Methods in Pakistan

(a) Marine Fishing (Coastal/Sea Fishing)

Done along Pakistan's 1,120 km coastline, mainly in:

- Sindh Coast: Karachi, Keti Bandar, Thatta

- Balochistan Coast: Gwadar, Pasni, Ormara, Jiwani

Methods Used:

- Trawling: Large boats drag heavy nets across the sea floor to catch shrimp and bottom fish.
- Gill Netting: Nets trap fish like tuna, sardines, and mackerel.
- Line Fishing: Long lines with baited hooks for larger species (e.g., tuna).
 - Purse Seining: Circular nets surround and trap schooling fish such as sardines.

Equipment: Motorized boats, trawlers, ice boxes, and sonar technology for detecting fish.

Employment: Thousands of fishermen depend on the coastal fishing industry, especially around Karachi and Gwadar.

(b) Inland Fishing (Rivers, Lakes, Reservoirs, Fish Farms)

Conducted in rivers, lakes, and man-made reservoirs, particularly in Punjab and Sindh.

- Rivers: Indus, Ravi, Chenab
- Lakes: Manchar (Sindh), Haleji (Sindh)
- Reservoirs: Tarbela, Mangla

Methods Used:

- Small boats with nets and traps.
- Traditional fishing with bamboo traps, hooks, and cast nets.
- Increasing use of fish farms (aquaculture) to boost production.

2. Fish Farming (Aquaculture in Pakistan)

Definition:

Fish farming (aquaculture) is the controlled breeding, rearing, and harvesting of fish in ponds, tanks, or reservoirs. It is a rectangular man made pond made for breeding fish, consisting of cemented bases to prevent water seepage and sides edged with mud for the same purpose, alongside trees to provide shade as well as oxygen for the fish.

It helps increase inland fish supply, reduce pressure on marine resources, and support rural incomes.

Main Locations:

Punjab: Sheikhpura, Gujranwala, Mandi Bahauddin, Sargodha

Sindh: Thatta, Badin, Larkana (especially near Indus delta and Manchar Lake)

Khyber Pakhtunkhwa: Small-scale trout farms in Swat and Chitral (cold water fish)

Types of Fish Farmed:

Warm Water Fish (Common in Punjab & Sindh):

- Rohu
- Grass carp, Silver carp

Cold Water Fish (KPK):

- Trout (Rainbow and Brown trout) — farmed in Swat, Gilgit, and Chitral due to cool climate.

Methods Used:

Pond culture: Fish reared in artificial or natural ponds with controlled feeding.

Integrated farming: Fish ponds combined with livestock or rice farming (waste used as fertilizer for ponds).

Hatcheries: Used to produce fish seed (young fish) for stocking ponds and lakes.

Use of gill netters, explosives, modern trawlers, etc are included

Advantages of Fish Farming:

Increases local fish production and reduces imports.

Provides employment and income for rural communities.

Allows year-round production under controlled conditions.

Helps conserve wild fish stocks by reducing overfishing.

Can use unused or waterlogged land effectively.

Problems Faced by Fish Farms:

Lack of technical knowledge among farmers.

Water pollution and poor quality affecting fish health.

Shortage of quality fish seed and feed.

Limited cold storage and transport for distribution.

High initial costs for pond construction and aeration systems.

Government Support:

The Fisheries Development Board (FDB) promotes aquaculture.

Research centers and training programs in Sindh and Punjab help improve breeding and feeding practices.

Subsidies and credit schemes available for small-scale fish farmers.

3. Examples of Fish

Marine Fish (Sea)

Pomfret, Tuna, Mackerel, Sardine, Shrimp, Lobster, Skaters, Rays, Catfish, Croakers, Drums

- Found along Sindh and Balochistan coasts
- Shrimp is a major export product

Inland Fish(Rivers/Lakes)

Rohu, Palla, Thalla, Trout, Mahseer

- Found in Indus River, Manchar Lake, and Tarbela Reservoir

Fish Farm Species

Rohu, Palla, Thalla, Grass carp, Silver carp, and Trout (in northern Pakistan)

4. Fishing Ports on the Coasts

- Karachi Fish Harbour (Sindh):
 - Pakistan's largest and busiest fishing port.
 - Includes processing plants, freezing units, and export facilities.
- Ketī Bandar (Sindh):
 - Traditional fishing center at the Indus delta.
- Gwadar (Balochistan):

- Modern port with expanding fisheries and export potential.

Pasni and Ormara (Balochistan):

- Medium-scale fishing towns providing fish to local and export markets.
-

5. Uses of Fish

Domestic Consumption:

- Rich in protein; staple food for coastal communities.

Exports:

- Shrimp, tuna, pomfret exported to China, Japan, UAE, and Europe, earning foreign exchange.

Fish Meal and Feed:

- By-products used in poultry and livestock feed.

Industrial Uses:

- Fish oil used in medicines, cosmetics, and soaps.

Employment:

- Thousands work in fishing, transport, processing, and marketing.
-

6. Improvements in Fishing Methods and Processing

Introduction of modern boats and trawlers with engines and refrigeration.

Use of GPS, sonar, and radio communication for fish detection.

Establishment of cold storage, freezing plants, and canning factories in Karachi and Gwadar.

Development of fish hatcheries and training programs for farmers.

Government projects through the Marine Fisheries Department to promote sustainable practices.

7. Problems Facing the Fishing Industry

Overfishing: Depleting fish stocks near Karachi and Sindh coasts.

Pollution: Industrial and oil waste contaminates coastal waters.

Old Methods: Many fishermen use outdated boats and nets.

Storage Issues: Lack of ice and refrigeration leads to spoilage.

Export Challenges: Poor hygiene standards limit access to foreign markets.

Climate Change: Sea temperature rise affects fish breeding.

Limited Awareness: Few trained workers for aquaculture management.

8. Future Possibilities and Sustainability

Expand Fish Farming: Increase aquaculture projects in Punjab and Sindh.

Modern Infrastructure: Build more harbours, storage, and processing plants.

Marine Conservation Zones: Protect fish breeding areas.

Education and Training: Teach sustainable fishing and farm management.

Government Regulation: Enforce fishing bans during breeding seasons and limit catch sizes.

Research and Innovation: Improve hatcheries, feed, and disease control for farmed fish.

Sample 2-mark Question:

Q: Name two methods used in marine fishing in Pakistan.

A: Trawling and gill netting.

Sample 4-mark Question:

Q: Explain why marine fishing is important for the economy of Pakistan. A: Marine fishing provides employment to thousands of fishermen along the coasts. It also earns valuable foreign exchange through exports of shrimp, tuna, and pomfret. Additionally, it supplies fish for domestic consumption and supports industries such as fish processing and boat building.

Sample 2-mark Question:

Q: Name two inland fishing areas in Pakistan.

A: Manchar Lake and the River Indus.

Sample 4-mark Question:

Q: Explain why inland fishing is increasing in Pakistan.

A: Fish farming has expanded in Punjab and Sindh due to controlled conditions, higher yields, and government support. Overfishing and pollution in marine waters have also pushed inland aquaculture as an alternative to meet growing demand.

- 2 Study Fig. 2, which shows a map of the coast of Pakistan.

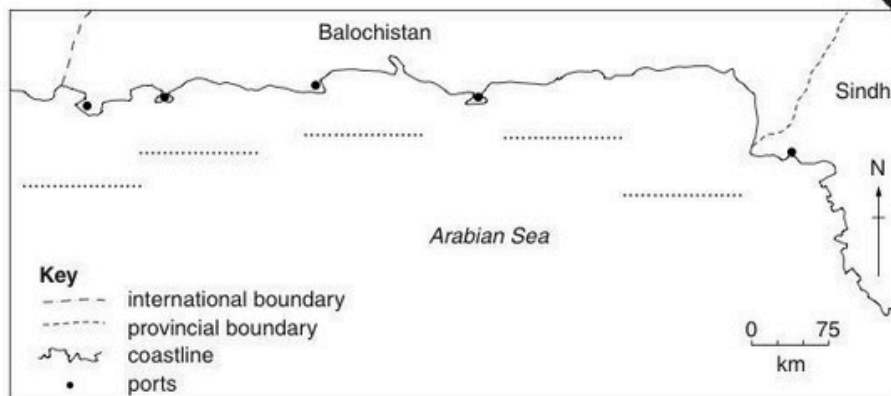


Fig. 2

- (a) (i) Name **on the map**, **two** of the ports shown. [2]
- (ii) Name **two** types of fish caught in the sea near Pakistan.
- 1 2 [2]

- (b) Study Fig. 3, which shows the contribution to Gross National Product (GNP) fishing industry in Pakistan.

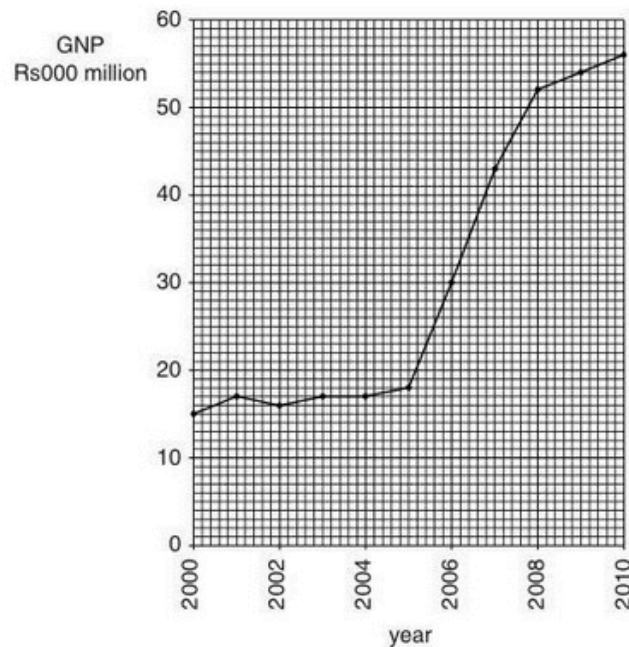


Fig. 3

- (i) What was the contribution to GNP of the fishing industry in 2010?
 [1]
- (ii) By how much has this figure increased since 2006?
 [1]
- (iii) What is meant by 'over-fishing'? Why does it occur?
 Over-fishing

 Why it occurs

 [3]

A map of Pakistan illustrating the distribution of fish farming. The landmass is outlined with a dashed line representing international boundaries. Major cities are marked with dots and labeled: Peshawar in the north, Quetta in the west, Lahore in the east, and Karachi on the southern coast. The Arabian Sea is labeled to the south of Karachi. Several rivers are shown as solid lines flowing across the country. Areas designated for fish farming are shaded in grey, with notable concentrations in the northwestern region, around Lahore, and in the coastal waters near Karachi. A key in the bottom right corner defines the symbols: a dashed line for international boundary, a solid line for river, a grey rectangle for fish farming, and a dash-dot line for disputed international boundary. A scale bar below the key indicates a distance of 300 km, and a north arrow is located in the top left corner.

(i) Describe the distribution of fish farming in Pakistan.

3

- [4]

- Primary
- Secondary
- Tertiary [3]

- Choice
- Benefits
- Problems
- [6]

Chapter 7: Agriculture

1. Importance of Agriculture in Pakistan

Definition:

Agriculture – The cultivation of land and rearing of animals to produce food, raw materials, and other products.

Importance:

Economic backbone – contributes about **20–24% of GDP**.

Employment –provides jobs for nearly **40–45% of the labour force**.

Food security –supplies staple foods such as wheat and rice.

Industrial raw material – cotton and sugarcane support textile and sugar industries.

Foreign exchange – exports (cotton, rice, fruits, leather) earn foreign currency.

Linkages –stimulates growth in transport, trade, manufacturing sectors.

2. Types of Agriculture in Pakistan

Type	Description	Example Areas	Key Crops
Irrigated farming	Uses water from rivers/canals/tubewells.	Indus Plain (Punjab, Sindh)	Wheat, rice, sugarcane, cotton

Rain-fed (Barani)	Depends on rainfall only.	Potwar Plateau, KP hills, Balochistan	Wheat, millet, pulses
Floodplain farming	Uses fertile alluvial soils after floods.	Indus Delta, lower Punjab	Vegetables, rice
Plantation farming	Large-scale fruit/cash crop farms.	Sindh, Balochistan	Mangoes, citrus
Livestock/pastoral farming	Animals reared for milk/meat/wool.	Balochistan, Thar Desert	Sheep, goats, camels

Keyword:

Barani –agriculture dependent entirely on rainfall.

Intensive farming – small area, high inputs, high yields (Punjab).

Extensive farming – large area, low inputs, low yields (Balochistan).

3. Cropping Seasons

Kharif Season (Summer Crops)

Sown: June–July

Harvested: Sept–Nov

Main crops: Rice, cotton, sugarcane, maize

Rabi Season (Winter Crops)

Sown: Oct–Dec

Harvested: Mar–May

Main crops: Wheat, barley, gram, oilseeds

4. Major Crops

Wheat

Season: Rabi

Regions: Punjab (Multan, Faisalabad), Sindh (Hyderabad)

Requirements: 10–20°C temperature, 25–75 cm rainfall, fertile loamy soil.

Irrigation: Canals & tube wells.

Uses: Staple food; flour, bread, chapati.

Problems: Shortage of water, poor seed quality, outdated tools.

Improvements: High-yield variety (HYV) seeds, fertilisers, timely irrigation.

Rice

Season: Kharif

Regions: Punjab (Gujranwala, Sialkot), Sindh (Larkana, Dadu)

Requirements: High temperature (>25°C), heavy rainfall or standing water, clay soil.

Irrigation: Flood irrigation.

Uses: Staple food, major export.

Problems: Water shortage, salinity, poor storage.

Improvements: HYVs (IRRI-6), mechanised transplanting, improved drainage.

Cotton

Season: Kharif

Regions: South Punjab (Multan, Bahawalpur), Sindh (Hyderabad, Nawabshah).

Requirements: 21–30°C, moderate rainfall (20–30 cm), well-drained loamy soil.

Irrigation: Canals/tube wells.

Uses: Textile industry, exports, seed oil.

Problems: Pests (bollworm), erratic rainfall, price fluctuation.

Improvements: BT cotton seeds, pesticides, better irrigation scheduling.

Sugarcane

Season: Kharif

Regions: Punjab (Faisalabad, Sargodha), Sindh (Thatta).

Requirements: 20–30°C, 100–175 cm rainfall (or irrigation), alluvial soil.

Uses: Sugar, molasses, ethanol.

Problems: Shortage of water, low recovery rate, delayed payments.

Improvements: Improved varieties, drip irrigation, fertiliser use.

Maize

Season: Kharif (sometimes spring).

Regions: KP (Mardan, Swat), Punjab (Sialkot).

Requirements: Warm, moderate rainfall (~60–90 cm).

Uses: Human food, animal feed, corn oil.

Problems: Poor seed quality, drought.

Improvements: Hybrid seeds, fertilisers.

5. Horticulture (Fruits and Vegetables)

Fruits: Mango (Sindh, Punjab), Citrus (Sargodha), Apple (Balochistan, KP).

Vegetables: Potato, onion, tomato, okra – grown near cities for markets.

Problems: Perishability, poor cold storage, middlemen exploitation.

Solutions: Cold storage facilities, farmer cooperatives, transport links.

6. Livestock Sector

Buffalo, cattle, sheep, goats, camels, poultry.

Buffalo (Nili-Ravi breed) → main milk source.

Sheep/goats → meat, wool, hides.

Camels → transport, milk in deserts.

Importance:

Provides **meat, milk, hides, employment**, and **exports** (leather, wool).

Problems:

Poor veterinary services, fodder shortage, disease (foot & mouth).

Improvements:

Artificial insemination, vaccination programs, dairy cooperatives.

7. Irrigation and Water Management

Indus Basin Irrigation System (IBIS)

Largest irrigation system in the world.

Components:

- **2 major dams:** Tarbela (Indus), Mangla (Jhelum).
- **Barrage system:** Sukkur, Guddu, Kotri, Chashma.
- **Link canals** balance water distribution.

Covers: Punjab and Sindh (main agricultural zones).

Water Problems:

Waterlogging: raised water table reduces oxygen for roots.

Salinity: salt buildup on surface, decreases fertility.

Shortage: uneven distribution, canal losses, overuse.

Solutions:

SCARP (Salinity Control & Reclamation Project) – tube wells, drainage.

Lining canals **water rotation (warabandi)** , efficient irrigation.

8. Modernisation and Green Revolution

Introduced in the **1960s–70s**.

High-Yield Varieties (HYV) of wheat and rice.

Tube wells increased irrigation area.

Fertilisers and pesticides boosted yields.

Mechanisation: tractors, harvesters, threshers.

Benefits:

Increased yields, food security, export growth.

Problems:

Regional inequality, soil degradation, dependence on chemicals.

9. Problems in Agriculture

Category	Examples
Physical	Salinity, waterlogging, floods, droughts, soil erosion
Economic	Price instability, poor credit, small holdings
Technical	Lack of machinery, outdated methods
Social	Tenancy system, illiteracy, rural poverty

10. Climate Hazards Affecting Agriculture

Floods

Heavy monsoon rain, river overflow, glacier melt.

Effects: crop destruction, soil erosion, salinity spread.

Management: flood embankments, drainage, early-warning systems.

Droughts

Occur in **Thar, Balochistan** during weak monsoon.

Effects: crop/livestock loss, migration, famine risk.

Management: drought-resistant crops, water harvesting, small dams.

Storms

Coastal Sindh and Balochistan experience cyclones.

Effects: crop flattening (rice, sugarcane), salinity intrusion.

Management: windbreaks, cyclone shelters, drainage systems.

11. Government Policies

Support prices for wheat, sugarcane, cotton.

Subsidies for seeds, fertilisers, machinery.

Kissan Card and micro-credit for small farmers.

Research institutions (NARC, PARC) develop HYVs.

Agricultural extension services train farmers.

12. Sustainable Farming Practices

Crop rotation and mixed cropping to maintain fertility.

Drip irrigation and sprinkler systems to save water.

Afforestation and contour ploughing to prevent erosion.

Integrated Pest Management (IPM).

Organic farming to reduce pollution.

13. Case Studies

A. Punjab Wheat-Rice Cropping System

Advantages: high yields, mechanised farms, double cropping.

Problems: salinity, over-irrigation, soil depletion.

Solutions: balanced fertilisers, efficient irrigation.

B. Thar Desert (Rain-fed area)

Problems: drought, sandy soil, low rainfall.

Solutions: rainwater harvesting, drought-resistant millet, fodder storage.

C. Coastal Sindh Cyclone Impact

Effects: rice/sugarcane destroyed, salinity intrusion.

Mitigation: embankments, cyclone warning system, salt-tolerant crops.

14. Sample Exam Questions

Q1 (2 marks)

Name two Kharif crops grown in Pakistan.

A: Cotton and rice.

Q2 (4 marks)

Explain two reasons why irrigation is essential for agriculture in Pakistan.

A:

1. Rainfall is unreliable and low in most regions.
 2. Irrigation allows multiple cropping seasons and higher yields.
-

Q3 (6 marks)

Describe and explain the main problems faced by farmers in Sindh.

A:

Salinity and waterlogging due to poor drainage.

Flooding damages crops and infrastructure.

Tenancy system limits incentives to improve land.

Government reclamation and drainage projects are solutions.

Q4 (8 marks)

Explain the causes and impacts of drought in Pakistan.

A:

Caused by below-average monsoon rainfall, high evaporation, and poor water storage.

Leads to crop failure, livestock deaths, food shortages, migration, and soil degradation.

Solutions: small dams, water conservation, drought-resistant seeds.

Q5 (10 marks)

Evaluate the success of agricultural modernisation in Pakistan.

A:

Positives:

Increased yields (especially wheat and rice).

Food security and self-sufficiency improved.

Mechanisation reduced dependence on labour.

Negatives:

Environmental issues (salinity, fertiliser pollution).

Widened gap between rich and poor farmers.

Dependence on imported inputs.

Judgment: Successful overall but needs equitable policies and sustainable techniques.

Chapter 8

Power Resources

3. Power

(a) Sources

Candidates should be able to:

- describe, with the help of a simple diagram for each method, how non-renewable fuels (coal, crude oil and natural gas) are extracted:
 - coal as obtained by open cast, adit and shaft mining methods
 - natural gas and crude oil obtained by exploration and drilling
- understand the difference between renewable and non-renewable sources of electricity
- explain (briefly) how electricity can be generated from renewable resources (hydel, wind, solar, and other possibilities such as wave, tidal, biofuels, geothermal)
- understand the importance of power sources for development.

(b) Non-renewables

Candidates should be able to:

- describe the quality and the amount of coal available from within Pakistan and how long reserves are likely to last, and also describe the types of coal which have to be imported for industrial purposes
- describe how coal both produced in Pakistan and imported is transported to the end users
- state how much natural gas is produced by Pakistan, and how long reserves are likely to last
- describe the extent of the natural gas pipeline network in Pakistan and explain how natural gas can be taken to those parts of Pakistan away from the pipelines, and the limitations of doing this
- state how much oil is produced by Pakistan, how long reserves will last and how much oil is imported, and explain why it is necessary to import large amounts of oil
- describe the extent of the oil pipeline network in Pakistan and describe the other methods that are used to transport both imported oil and oil produced in Pakistan
- understand that electricity can be generated in a variety of ways. In thermal

power stations by burning coal, oil, gas and waste, or with nuclear energy; or with renewable sources e.g. water (including hydel), the wind and the sun

- understand that non-renewable power sources are running out, and are increasing in price

(c) Renewables

Candidates should be able to:

- explain and evaluate the advantages and disadvantages of the different methods of producing electricity from renewable resources (generated by water, wind, wave and sun)
- understand the physical and human conditions that favour the development of multi-purpose hydel schemes
- state and explain the factors, both physical and human, which promote or hinder the availability of electricity and other power resources listed, including the feasibility of small-scale, renewable power generation
- explain why the supply of electricity is not sufficient or reliable to develop many parts of Pakistan.

3.Power

(a)Sources

1. Extraction of Non-Renewable Fuels (Coal, Oil, and Natural Gas)

Coal Extraction Methods

Open-cast (surface) mining:

- Topsoil and overburden removed to expose coal seams.
- Large excavators and trucks used to extract and transport coal.
- Suitable for shallow coal deposits, such as in the Thar coalfield (Sindh).
- Economical but environmentally damaging (deforestation, land

degradation).

- Adit mining:
- Horizontal tunnels driven into hillsides to access coal seams.
- Safer and cheaper than deep shaft mining, but only viable in hilly areas.
- Shaft mining:

- Vertical shafts sunk deep underground to reach buried seams.
- Used for deep coal deposits.
- Requires advanced ventilation and safety systems.

Oil and Natural Gas Extraction

Exploration involves seismic surveys and test drilling to locate reserves.

Drilling rigs borewells to access crude oil or gas trapped beneath impermeable rock layers.

Production wells extract the fuel using pumps and pressure from natural gas.

Fuels are then transported by pipelines, tankers, or rail/road to refineries or power plants:

1. Pipelines

Benefits:

Efficient and continuous transport: Pipelines can move oil, gas, and water continuously over long distances without interruption.

Low operating cost: Once built, they require little labour and energy to operate.

Safe and reliable: Reduced risk of accidents and spills compared to road or rail transport.

Environmentally friendly: Less air pollution since no fuel-burning vehicles are involved.

Drawbacks:

High construction cost: Very expensive to build and install, especially across mountains or seas.

Leakage risk: Any leakage can cause serious environmental damage and may go unnoticed for some time.

Limited flexibility: Pipelines can only carry liquids or gases along fixed routes.

Difficult to repair: Maintenance and repair can be costly and time-consuming.

2. Road Tankers

Benefits:

Flexible and mobile: Can deliver directly to petrol stations, industries, or remote areas.

Low initial cost: Cheaper to buy and operate compared to building pipelines or rail systems.

Fast for short distances: Ideal for local or regional deliveries.

Door-to-door service: No need for loading and unloading at multiple points.

Drawbacks:

High risk of accidents: Tankers can cause explosions, fires, or oil spills on roads.

Traffic congestion: Adds to road traffic and wear on infrastructure.

High fuel cost: Expensive to run over long distances.

Pollution: Contributes to air and noise pollution.

3. Rail Tankers

Benefits:

Good for bulk transport: Can carry large volumes of oil, gas, or chemicals efficiently over long distances.

Safer than road transport: Fewer accidents and less risk of spillage.

Energy-efficient: Trains can move large loads using less fuel per tonne than trucks.

Reliable schedules: Operate on fixed timetables for industrial supply chains.

Drawbacks:

Limited routes: Restricted to areas with railway networks.

Extra handling: Goods must be transferred at stations to road tankers or pipelines.

High capital cost: Requires investment in rail infrastructure and tank wagons.

Less flexible: Cannot deliver directly to individual destinations.

Oil Transport by Sea

Definition:

Oil transport by sea means moving **crude oil and refined petroleum products** using **oil tankers** and **ships** across oceans and seas, from oil-producing countries to refineries or markets around the world.

Advantages of Transporting Oil by Sea

1. Large Capacity

- Ships can carry millions of barrels of oil at once, making it **economical for long distances**.

2. Lower Cost per Unit

- Transporting by sea is **cheaper** compared to road or air for the same amount of oil.

3. Global Reach

- Sea routes connect **oil-producing regions (like the Middle East)** with **major consumers (like South Asia, Europe, East Asia)**.

4. Reduced Land Congestion

- Using sea transport reduces pressure on roads, pipelines, and railways.

5. Flexibility

- Ships can **change routes** if needed due to demand, weather, or political issues.

Disadvantages of Transporting Oil by Sea

1. Oil Spills and Pollution

- Accidents or leaks can cause **severe marine pollution** (e.g. oil slicks harming fish, birds, and beaches).

2. High Risk of Accidents

- Collisions, fires, or explosions at sea can cause environmental disasters.

3. Weather Delays

- Storms or rough seas can delay or damage shipments.

4. Port Congestion and Costs

- Ports need **special infrastructure** for loading/unloading oil, which increases cost.

5. Security Threats

- Ships can be affected by **piracy or territorial disputes** (especially near the Arabian Sea or Strait of Hormuz).

Oil Transport by Sea in Pakistan

1. Main Ports Used:

- **Karachi Port, Port Qasim, and Gwadar Port** handle most of Pakistan's imported crude and petroleum products.

2. Import Dependence:

- Pakistan imports **most of its oil** by sea, mainly from **Saudi Arabia, UAE, and other Gulf countries**.

3. Oil Terminals and Storage:

- Ports have **oil terminals** for storage and transfer to refineries (e.g. Karachi's Keamari terminal, Port Qasim oil terminal).

4. Link with Inland Transport:

- From ports, oil is moved inland by **pipelines, rail tankers, or road tankers** to refineries and markets.

5. Strategic Importance of Gwadar:

- Gwadar Port is being developed for **oil trade and storage**, especially under the **China-Pakistan Economic Corridor (CPEC)**.

2. Renewable vs Non-Renewable Sources

Non-Renewable Energy:

Derived from finite resources such as coal, oil, and natural gas. Cannot be replaced once consumed; reserves will eventually deplete. Major source of greenhouse gases (CO₂, SO₂, NO_x). Provide bulk of Pakistan's current energy supply (thermal power).

Renewable Energy:

Derived from natural, replenishable processes such as hydel, solar, wind, tidal, geothermal, and biofuels.
Sustainable in the long term; minimal pollution.
Require initial investment and technology, but reduce dependency on imported fuels.

3. Generation of Electricity from Different Sources

Thermal Power Generation:

Coal, oil, or gas burned to heat water → steam turns turbines → electricity generated.

Main thermal plants: Guddu, Kotri, Muzaffargarh, Jamshoro.
Quick to set up but costly due to imported fuel.

Hydroelectric Power (Hydel):

Dams store water at height; water released through turbines generates power.

Examples: Tarbela, Mangla, Warsak, Neelum–Jhelum, Ghazi Barotha.
Renewable and cheap after construction, but costly to build initially.

Solar Power:

- Photovoltaic panels convert sunlight directly to electricity.
- Best suited to sunny regions (Sindh, Balochistan).
- Increasingly used in rural electrification and small-scale domestic systems

Methods of Solar Power Generation

1.Solar Cells (Photovoltaic Cells)

Method:

Solar cells (or photovoltaic cells) convert **sunlight directly into electricity**.

When sunlight hits the cell, it excites electrons in the semiconductor (usually silicon), producing an electric current.

Many cells are combined to form a **solar panel**.

Uses:

Powering calculators, street lights, satellites, and small home systems.

Advantages:

Produces clean and renewable electricity.

Works even in remote areas without a power grid.

Silent and low maintenance.

Disadvantages:

Expensive to manufacture.

Efficiency depends on sunlight (less effective on cloudy days or at night).

2. Solar Panels (Solar Photovoltaic Systems)

Method:

A **group of solar cells** arranged together on a panel collects sunlight.

The energy is converted into **direct current (DC)** electricity, then changed into **alternating current (AC)** using an inverter for home or industrial use.

Solar panels are often installed on rooftops or large solar farms.

Uses:

Supplying electricity to homes, schools, and industries.

Charging batteries and powering rural areas.

Advantages:

Renewable and non-polluting.

Reduces dependence on fossil fuels.

Can store energy using batteries.

Disadvantages:

Requires large space for installation.

Output varies with time of day and weather.

3. Solar Furnaces (Concentrated Solar Power – CSP)

Method:

Uses **mirrors or lenses** to concentrate sunlight onto a single point (the receiver).

The focused sunlight heats air, oil, or molten salt to produce steam.

The steam drives a **turbine** connected to a **generator**, producing electricity.

Uses:

Large-scale electricity generation in power plants.

Industrial heating and research experiments.

Advantages:

Produces large amounts of energy.

No fuel needed after installation.

Can store heat for use at night.

Disadvantages:

Very costly to build and maintain.

Needs clear, sunny climates (desert regions are ideal).

Requires large open areas.

Wind Power:

Wind turns turbine blades, generating electricity via generators.

Coastal areas (Gharo, Jhimpir) and mountainous passes are suitable.

Intermittent, depends on wind consistency.

Methods of Wind Power Generation

1. Wind Turbines (Modern Method)

Method:

Wind turbines convert **kinetic energy of moving air** into **electrical energy**.

When the wind blows, it turns the blades of the turbine.

The rotating blades spin a **shaft** connected to a **generator**, producing electricity.

Groups of turbines are placed together in a **wind farm** (on land or offshore).

Uses:

Generating electricity for homes, industries, and national grids.

Common in coastal and open areas with steady winds.

Advantages:

Renewable and clean source of energy.

No air or water pollution.

Low operating cost after installation.

Can be built on farmland without disturbing other uses.

Disadvantages:

Unreliable — depends on wind speed and weather conditions.

Noisy and may spoil natural scenery.

High initial installation cost.

May harm birds and bats.

2. Windmills (Traditional Method)

Method:

Windmills use wind energy to turn **mechanical devices** rather than generators.

The rotating blades drive a **shaft** that powers machines such as **water pumps**, **grinding stones**, or **sawmills**.

Used mainly before modern electricity systems developed.

Uses:

Pumping underground water for irrigation.

Grinding grains into flour.

Cutting wood or processing crops in rural areas.

Advantages:

Simple and cheap technology.

Does not require fuel.

Useful in rural or remote regions.

Disadvantages:

Cannot generate electricity directly.

Works only when there is enough wind.

Low efficiency and limited power output.

Other Renewable Methods:

Tidal energy

Tidal energy is the power generated from the **rise and fall of sea levels (tides)** caused by the **gravitational pull of the Moon and the Sun** on the Earth's oceans.

How It Works (Methods):

- 1. Tidal Barrages:**

- A **dam-like structure** is built across the mouth of a river or an estuary.
- As the tide rises, water flows into the basin behind the barrage.
- When the tide falls, the stored water is released through **turbines**, generating electricity — similar to a hydroelectric dam.

2. **Tidal Stream Generators:**

- These work like **underwater wind turbines** placed in areas with fast-moving tidal currents.
- As water flows past the blades, it turns them, driving a **generator** to produce electricity.

3. **Tidal Lagoons:**

- Artificial lagoons are created along coastlines to trap seawater during high tide and release it through turbines during low tide.

Advantages:

Renewable and sustainable: Energy is generated from natural tidal movements that occur daily.

Predictable: Tides follow regular and known cycles, making power generation reliable.

Clean energy: Produces no greenhouse gases or air pollution.

Long lifespan: Tidal structures can last for many decades.

Disadvantages:

High construction cost: Building tidal barrages or lagoons is very expensive.

Limited suitable sites: Only certain coastal areas with large tidal ranges are suitable.

Environmental impact: Can affect marine life, fish migration, and sediment flow.

Irregular output: Energy is only produced when tides are moving (twice a day).

Pakistan has good **tidal energy potential**, especially along the Sindh coast (Indus Delta creeks) and the Balochistan coast (e.g. Sonmiani, Kalamat etc.)

Tidal height (range) of 2-5 metres is observed in certain creek systems.

Some private/company interest and government licensing have been given for tidal projects, but nothing has come into full operational status yet.

Geothermal energy

Geothermal energy is the **heat energy from within the Earth's crust**.

It is produced by the **decay of radioactive materials** and the **heat left over from the planet's formation**.

This natural heat can be used to produce **electricity** or for **direct heating**.

How It Works (Methods):

1. Geothermal Power Plants:

- Wells are drilled deep into **hot rocks or geothermal reservoirs** to reach steam or hot water.
- The steam rises through pipes and spins a **turbine** connected to a **generator**, producing electricity.
-

2. Direct Heating Systems:

- Hot water from underground is piped directly into **buildings, greenhouses, or fish farms** for heating.

Advantages:

Renewable: The Earth's heat is continuously produced and is not likely to run out.

Clean and green: Emits very little greenhouse gas compared to fossil fuels.

Reliable: Provides continuous power (unlike solar or wind, which depend on weather).

Low running cost: Once a plant is built, it is cheap to operate.

Disadvantages:

High initial cost: Drilling deep wells and building plants are very expensive.

Limited locations: Only possible in regions with volcanic or tectonic activity (e.g., Iceland, New Zealand, Indonesia).

Possible land subsidence: Removing steam or water can cause the ground to sink.

Release of gases: Small amounts of hydrogen sulfide and other gases may escape from underground.

Potential

Pakistan has considerable geothermal potential. There are many **hot springs, fumaroles (steam vents), mud volcanoes**, and elevated geothermal gradients in several regions.

Some specific areas with high potential:

- **Balochistan** — Chagai volcanic arc, Taftan, Nokandi, Chaghi etc. There are dormant/dormant-volcano zones, hot springs, magmatic waters ($\approx 150^{\circ}\text{C}$) in places.
- **Sindh and the Indus Basin** — co-produced geothermal water (i.e. hot water associated with hydrocarbon fields) with temperatures in the range of $\sim 80\text{-}170^{\circ}\text{C}$.
- **Northern Mountain Areas / Himalayan collision zone** — hot springs in areas like Kotli (Azad Kashmir).

Some estimates:

- It has been claimed (by researchers) that geothermal resources in Pakistan *could* generate up to $\sim$ **100,000 MW** of electricity, under ideal exploitation.
- Short-term commercially viable exploitation is estimated (by some sources) at $\sim 5,000$ MW in certain locations.

Biofuels

Definition:

Biofuels are fuels made from organic materials such as plants, crops, and animal waste. Common types include **bioethanol**, **biodiesel**, and **biogas**.

Advantages of Biofuels

1. **Renewable Source of Energy**
Made from crops and waste that can be regrown or reproduced.
2. **Environmentally Friendly**
Produces less carbon dioxide (CO_2) compared to fossil fuels, helping to reduce global warming.
3. **Reduces Waste**
Organic waste materials (like crop residues or animal dung) can be reused to

produce energy.

4. **Supports Farmers and Rural Economy**

Farmers can grow energy crops like sugarcane or maize, providing additional income.

5. **Reduces Dependence on Imported Oil**

Helps countries like Pakistan save foreign exchange by producing some fuel locally.

Disadvantages of Biofuels

1. **Uses Agricultural Land**

Land used for energy crops could instead be used for growing food, leading to food shortages.

2. **High Water Usage**

Crops like sugarcane need a lot of water, which can worsen water scarcity.

3. **Expensive Production**

The technology and processes used to produce biofuels are costly compared to fossil fuels.

4. **Lower Energy Output**

Biofuels usually provide less energy per litre than petrol or diesel.

Usage in Pakistan

- Pakistan mainly produces **biogas** from animal waste and **bagasse (sugarcane waste)** from sugar mills.
- **Bioethanol** is produced from sugarcane molasses and used in blending with petrol.

The **Pakistan Council of Renewable Energy Technologies (PCRET)** promotes small biogas plants in rural areas.

Many rural households use **biogas plants** for cooking and lighting.

Biofuels are being explored as a way to reduce dependence on imported oil and support rural energy needs.

4. Importance of Power Sources for Development

- **Industrial growth:** continuous power essential for factories and manufacturing.
- **Agricultural productivity:** supports tube wells, processing units, and cold storage.
- **Transport:** fuels needed for road, rail, and air transport.
- **Urban development:** electricity crucial for lighting, water supply, and domestic use.
- **Economic stability:** energy shortages cause inflation, unemployment, and reduced exports.
- **Social improvement:** access to electricity improves education, healthcare, and communication.

(b) Non-Renewable Power Sources

1.Coal

- Reserves and Quality:
- Major deposits: Thar (Sindh), Makerwal (Punjab), Lakhra (Sindh), Salt Range.
- Pakistan has large reserves but mostly **lignite** coal (low calorific value, high moisture).
- Limited domestic use in power plants due to low quality.
- Imports:
- Higher-grade coal imported for steel and cement industries from South Africa, Indonesia, and Australia.

- Transportation:
- Domestic coal transported by rail or truck to industrial users.
- Imported coal arrives at Karachi Port and moves to plants such as Sahiwal Coal Power Plant.
- Lifespan and Use:
- Reserves could last decades if fully exploited, particularly the Thar field.
- Environmental concerns include air pollution and land degradation.

2. Natural Gas

- Production:
- Major fields: Sui (Balochistan), Mari (Sindh), Qadirpur (Sindh), Uch (Balochistan).
- Pakistan was once self-sufficient but reserves are declining.
- Distribution:
- Nationwide network from Sui Gas Field supplies domestic, industrial, and power sectors.
- Pipelines extend from Balochistan and Sindh to Punjab and KPK.
- Imports:
- Imported as LNG (liquefied natural gas) through terminals at Port Qasim and Gwadar.
- Proposed pipeline imports from Iran (IP pipeline) and Turkmenistan (TAPI).
- Limitations:
- Leakage, theft, and inefficiency in distribution cause major losses.
- Depletion of reserves increasing reliance on imports.

3. Oil

- Production:
- Domestic oil fields in Potwar Plateau (Attock, Dhurnal), Badin (Sindh), and Khaur.
- Output meets only a small fraction of national demand.
- Imports:
- Over 70% of oil consumed is imported via sea routes to Karachi and Bin Qasim ports.
- Imported crude refined in Attock, Pak-Arab, and National Refineries.
- Transportation:
- Pipelines transport crude from ports to refineries and cities (e.g. Karachi–Mahmood Kot Pipeline).

- Also moved by rail tankers and trucks.
- Issues:
- Rising global oil prices strain Pakistan's foreign exchange reserves.
- Dependence on imported oil makes the economy vulnerable to price shocks.
- Pollution and greenhouse gas emissions are major environmental concerns.

4.Electricity Generation Methods

- Thermal Power: generated by burning fossil fuels; flexible but costly.
- Nuclear Power: generated through atomic reactions (uranium) at Chashma and Karachi plants; reliable but expensive setup and safety concerns.
- Hydel Power: cheap, renewable, but depends on rainfall and water storage capacity.
- Renewable Sources: small-scale solar and wind installations expanding gradually.

5.Limitations and Challenges of Non-Renewables

- Non-renewable resources are finite and are depleted rapidly.
- Extraction and transport costs are increasing. Dependence on imported fuels worsens balance of payments. Environmental degradation, air pollution, and greenhouse gas emissions.
- Unequal distribution and outdated power infrastructure cause frequent load-shedding.

(c)Renewables

1.Advantages and Disadvantages of Renewable Energy

Hydroelectric Power (Hydel):

- Advantages:
- Renewable, low running costs after construction, no fuel import needed.
- Multipurpose use: irrigation, flood control, and recreation.
- Disadvantages:

- High initial capital cost; long construction time.
- Sedimentation reduces dam capacity; displaces local communities.

Wind Power:

- Advantages:
- No fuel cost, no pollution, renewable.
- Suitable for coastal and desert regions with strong steady winds.
- Disadvantages:
- Irregular output depends on wind strength.
- Requires large open land areas; visual and noise concerns.

Solar Power:

- Advantages:
- Abundant sunlight in most of Pakistan, especially Balochistan and Sindh.
- Ideal for rural electrification and domestic heating.
- Disadvantages:
- Expensive panels and batteries; efficiency drops on cloudy days.
- Requires regular maintenance.

Other Renewables (Tidal, Biofuels, Geothermal):

- Advantages: Sustainable and eco-friendly energy sources.
- Disadvantages: Technologically demanding; limited development in Pakistan.

2. Conditions Favouring Hydel Development

- Mountainous regions (northern Pakistan, Khyber Pakhtunkhwa, Gilgit-Baltistan).
- Steep river gradients producing high potential energy.
- Abundant water flow from Indus and its tributaries.
- Strong bedrock suitable for dam construction.
- Existing infrastructure from Indus Basin Water Treaty projects.

3. Physical and Human Factors Influencing Power Development

Physical Factors:

- Climate (rainfall, sunshine, wind speed).
- River flow and topography.

- Water availability and sediment load.

Human Factors:

- Availability of capital and foreign investment.
- Government policy, political stability, and energy planning.
- Skilled labour and technology for renewable energy projects.
- Infrastructure such as transmission networks and access roads.

4. Reliability and Supply Issues in Pakistan

- Power shortages are frequent due to high demand and inadequate generation capacity.
- Poor maintenance and transmission losses cause large-scale inefficiencies.
- Circular debt problem among generation, transmission, and distribution companies.
- Rural electrification lags behind urban areas, limiting regional development.
- Need for diversification: reducing dependence on oil and gas, promoting renewables.

Past Paper Questions

3 (a) (ii) Describe how coal is mined in an open cast mine. [2] **(M/J/25)**

In an open-cast mine, the top layer of soil is removed using bulldozers and draglines to expose the coal seams. Large **shovels and trucks** are then used to extract and carry the coal to processing or storage areas. After mining, the land may be **refilled and reclaimed** to reduce environmental damage.

3 (a) (iv) Explain why the cost of some non-renewable power sources in Pakistan may increase. You should develop your answer. [4]

The cost of non-renewable power sources in Pakistan may increase because fossil fuels like oil, gas, and coal are limited resources, and their reserves are being used up faster than they are found. As supplies decline, import prices rise, especially since Pakistan depends heavily on imported oil and LNG. Additionally, international fuel prices fluctuate, and a fall in the value of the Pakistani rupee makes imports more expensive. Costs also rise due to transportation, refining,

and stricter environmental regulations that increase the expenses of using non-renewable fuels.

3 (c) (i) Define 'renewable energy'. [1]

Renewable energy is energy obtained from natural sources that can be replaced or replenished naturally, such as sunlight, wind, and water.

(ii) Describe how electricity can be generated from geothermal resources [2]

Cold water is pumped underground to hot rocks, where it is heated to produce steam. The steam then drives a turbine connected to a generator, producing electricity.

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15

(d) Read the following two views about ways to increase renewable power generation in Pakistan:

A

Pakistan should focus more on small-scale power generation such as solar panels in villages.

B

Pakistan should focus more on large-scale power-generation projects such as hydel dams.

Which view do you agree with more? Give reasons to support your answer and refer to examples you have studied. You should consider view A and view B in your answer.

I agree with statement A, as Pakistan has insufficient energy resources in various rural areas of Pakistan and so solar panels are quite useful since they do not need to be connected to the grid system while Pakistan receives 250-300 days of the sunlight, making it viable, and especially available in the rural areas of Pakistan, where cost of transmission line extension is very expensive and inefficient. Similarly, Pakistan has more potential for small-scale power generation since it has less financial resources, so large scale projects such as the Tarbela Dam, are expensive and difficult to maintain and use as well. Similarly, small scale power generation can encourage rural electrification and well which may reduce rural-urban migration and stimulate economic activity and investment in remote areas. Such areas can also launch biogas projects which make use of methane and other resources which are readily available for domestic heating, especially in areas where physical conditions restrict transmission line development. [6]

Total: 25]



3d) .. such as areas in Abbottabad, Muzehra, etc. Moreover, large scale projects add a burden towards limited land resources and an increasing population and may thus restrict development, especially when they lead to various provincial disputes with the Kalamanghdam which has ultimately faced stiff opposition from various provinces.

Similarly, large-scale projects are economically unfeasible and government funds are insufficient for development. Certain factors such as winters and siltation have led to less water as a result from less snow melting which ultimately have led to unreliability of large scale projects, especially due to mismanagement of such subprojects that ultimately may lead to a loss of electricity amongst transmission lines and increased electricity theft, as large scale projects are difficult to maintain and many of them are slow to come into operation and lead to large-scale evacuation as more than 10000 people had been evacuated from Mangladam during its construction.

Therefore, it can be said that in a country deficient in economic resources and (65% people live in rural areas) a non-electrified rural population, the provision of small-scale projects is necessary.

Past Paper Questions [Unsolved]

7

- (c) (i) What is hydel power? Tick (✓) **one** box below.

Hydel power is electricity generated using energy from:	tick (✓)
fast flowing water	
the sun's rays	
tides and waves	
wind	

[1]

- (ii) Hydel power stations can be found in mountainous areas of Pakistan. Describe how electricity can be generated from hydel power.

.....

.....

.....

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.....

.....

.....

.....

[4]

(d) Power sources are vital for economic development in Pakistan.

To what extent can hydel power be relied upon for the future economic development of Pakistan? Give reasons to support your **judgement** and refer to examples you have studied. You should consider **different** points of view in your answer.

[illegible]

[Total: 25]



(c) (i) State **one** use of coal in Pakistan.

..... [1]

(ii) **Complete** the statements about how coal and natural gas are obtained. Choose the correct words from the box and place them in the spaces provided.

Coal is extracted by

Natural gas is extracted by

burning	deforestation	dredging
drilling	mining	pipelines

[2]

(iii) Explain **two** challenges of providing natural gas to some areas of Pakistan. You should develop your answer.

1

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.....

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2

.....

.....

.....

[4]

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN





- B

Importing mineral resources to Pakistan is the best way to support economic development.

6

[6]

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[Turn over

Learning Goals for Pakistan Studies/02 (Geography)

Chapter 9 Industries

5. Industrial development

(a) Understanding common terms

Candidates should:

- understand the meaning of the terms *raw materials*, *refined*, *processed*, *manufactured* and *value-added*
- understand the meaning of the terms *infrastructure* and *services*
- be able to define the terms *primary industry*, *secondary industry*, and *tertiary industry*.

(b) Secondary and tertiary industries

Processing and manufacturing industries to be studied: cement, cotton (from ginning to clothing), sugar refining, crafts, fertiliser, iron and steel, brick, oil refining, sports goods, surgical instruments. Tourism.

Candidates should be able to:

- understand the definitions used in Pakistan to distinguish between large-scale industry, small-scale industry and cottage industry
- state the main products of the listed industries and whether they are destined for the domestic market and/or for the export market
- state the main locations of the listed industries and explain the factors influencing location and development – capital, site, sources of raw materials, power, water, labour, communications, government policy and other means
- understand the differences between the formal sector and informal sector of industry
- understand the range of services provided by the informal sector, and their advantages and disadvantages to the development of Pakistan
- understand the importance of both the formal and informal sectors, and evaluate the contributions of both sectors to the development of the listed industries
- understand sources of capital and labour
- state and explain how the governing authorities promote industrial growth
- name examples of export processing zones and other industrial estates, explain the reasons for their development and describe their characteristics
- assess the feasibility of using global communications to enhance employment opportunities in service industries, e.g. call centres
- state and describe briefly, with an example of each, some of the natural and cultural attractions of Pakistan that are, or could be made available to tourists
- assess the feasibility of developing tourism as a means of increasing employment, development, gross national product (GNP) and gross domestic product (GDP).

Industrial Development

(a) Understanding Common Terms

Key Definitions

Term	Meaning
Raw materials	Natural resources used to make goods, e.g. cotton, limestone, sugarcane.
Refined	Removal of impurities from raw materials (e.g. crude oil → petrol).
Processed	Changing raw materials into a usable form (e.g. wheat → flour).
Manufactured	Finished products made from raw/processed materials (e.g. cars, clothing).
Value-added	Increase in product value through processing or manufacturing.
Infrastructure	Basic physical and organisational facilities – roads, railways, power, water, ports.
Services	Activities that provide support rather than goods, e.g. transport, banking, tourism.
Primary industry	Extracts natural resources (e.g. mining, fishing, farming).
Secondary industry	Processes or manufactures goods (e.g. cement, textiles, steel).
Tertiary industry	Provides services (e.g. transport, retail, tourism, education).

(b) Secondary and Tertiary Industries

1. Types of Industry

Type	Large-scale industry	Definition	Example
		Uses heavy machinery, large capital, many workers.	Steel, cement, fertilizer.

Small-scale industry	Uses limited machinery, local labour, less capital.	Sports goods, garments.
Cottage industry	Home-based, manual skills, traditional methods.	Handicrafts, embroidery.

2. Key Industries of Pakistan

Industry	Main Products	Locations	Key Factors Influencing Location
Cement	Cement, concrete	Karachi, Hyderabad, D.G. Khan	Limestone availability, power, transport.
Cotton / Textile	Yarn, cloth, garments	Karachi, Faisalabad, Multan, Lahore	Raw cotton supply, labour, power, ports.
Sugar refining	White sugar, molasses	Punjab, Sindh (near sugarcane fields)	Raw material (sugarcane), water, local market.
Crafts	Carpets, pottery, embroidery	Multan, Bahawalpur, Swat, Hala	Skill-based labour, tradition, local markets.
Fertiliser	Urea, ammonium nitrate	Multan, Faisalabad, Daharki	Natural gas supply, chemical plants.
Iron & Steel	Steel bars, sheets, rods	Karachi (Pakistan Steel Mills)	Imported iron ore, port, power, capital.
Bricks	Bricks for construction	Punjab plains, near clay sources	Clay, water, nearby cities.
Oil refining	Petrol, diesel, kerosene	Karachi, Attock	
Sports goods	Footballs, bats, gloves		Near ports and oil fields.
Surgical instruments	Scalpels, scissors	Sialkot	Skilled labour, export markets.
Tourism (tertiary)	Hospitality, transport, guide services	Sialkot	Skilled labour, export-oriented.
		Northern Areas, Swat, Murree, Lahore	Natural beauty, cultural heritage, accessibility.

3. Formal vs Informal Sector

Aspect	Formal Sector	Informal Sector
Definition	Registered businesses following government laws.	Unregistered small-scale or street businesses.
Examples	Factories, banks, hotels.	Street vendors, home-based work, rickshaw drivers.
Advantages	Generates tax, stable jobs, access to credit.	Provides income for poor, low-cost services.
Disadvantages	Costly to start, bureaucracy.	No job security, no tax revenue, poor working conditions.
Role in development	Drives economic growth, creates skilled jobs.	Reduces unemployment but contributes little to GNP.

4. Sources of Capital and Labour

Capital sources: Banks, investors, government loans, foreign aid, industrial estates, overseas remittances.

Labour sources:

- *Skilled:* engineers, technicians (urban areas, industrial training).
- *Unskilled:* rural migrants, low-wage workers.

Training programs and technical institutes help improve industrial workforce quality.

5. Government Promotion of Industry

Policies and initiatives:

- Tax incentives and subsidies.
- Establishment of **Export Processing Zones (EPZs)** and **Industrial Estates**.
- Investment promotion via **BOI (Board of Investment)**.

- **Public-Private Partnerships (PPP)** for infrastructure.
- Special focus on energy supply, transport, and skilled labour training.

6. Export Processing Zones (EPZs) and Industrial Estates

Zone/Area	Main Industries	Purpose/Features
Karachi EPZ	Garments, electronics, chemicals	Tax-free import/export, nearport.
Sialkot	Sports goods, surgical instruments	Export-oriented, skilled labour.
Risalpur / Gujranwala / Saindak	Engineering, mining	Regional industrial growth.
Industrial Estates (Faisalabad, Hattar, Korangi)	Textile, food, plastic, steel	Planned industrial zones with roads, water, power.

Reasons for development:

To attract **foreign investment** , increase exports, and reduce unemployment.

Provide **modern infrastructure** and easy customs procedures.

7. Global Communications & Service Industries

Growing **IT and call centre** sector due to cheap English-speaking labour.

Jobs in **outsourced services** (data entry, telemarketing, accounting).

Challenges: Poor internet infrastructure, unreliable power, limited training.

Feasibility: High in major cities (Karachi, Lahore, Islamabad), limited in rural areas.

8. Tourism Industry (Tertiary Sector)

Natural Attractions

Mountains: K2, Nanga Parbat, Hunza, Swat.

Lakes/Rivers: Saif-ul-Malook, Indus River, Attabad Lake.

Deserts: Thar, Cholistan.

Cultural Attractions

Historicalsites: Mohenjo-Daro, Taxila, Lahore Fort, Badshahi Mosque.

Festivals: Shandur Polo, Basant.

Religioussites: Faisal Mosque, Kartarpur Corridor.

Importance

Earns **foreign exchange**.

Creates **employment** in hotels, transport, and handicrafts.

Promotes the international **image** of Pakistan.

Problems

Security concerns, poor infrastructure, lack of promotion.

Feasibility

High potential due to **diverse landscapes** and **lowcosts** .

Needs **safety,investment, and better marketing** to thrive.

9. Contribution of Industry to Development

Diversifies the economy beyond agriculture.

Provides employment and raises living standards.

Increases exports, earning foreign exchange.

Boosts GDP and GNP.

Encourages urbanisation and infrastructure growth.

Past Paper Questions

Section A Short Questions (1–3 marks)

Q) Define the following terms:

- (a) Primary industry
- (b) Secondary industry
- (c) Tertiary industry

Q) What is meant by the term *value-added*?

Q) Give two examples of *cottage industries* in Pakistan.

Q) Explain the difference between *large-scale* and *small-scale* industries.

Q) Define *infrastructure* and give one example of each type (physical and social).

Q) What is meant by the *informal sector*?

Q) Give two advantages of the informal sector to Pakistan's economy.

Q) Name two *export processing zones (EPZs)* in Pakistan.

Q) Give one reason why the government encourages the establishment of EPZs.

Q) Identify one *natural* and one *cultural* tourist attraction in Pakistan.

Section B Structured Questions (4–6 marks)

Q) Explain the main factors that influence the location of the cement industry in Pakistan. [4]

Q) Explain why the textile industry is important for Pakistan's exports. [4]

Q) Describe how the availability of raw materials affects the location of the sugar industry. [4]

Q) Explain two reasons why Pakistan imports iron and steel. [4]

Q) Describe how government policy has encouraged industrial development in Pakistan. [6]

Q) Explain how the informal sector contributes to employment and services in Pakistan. [6]

Q) Describe the main factors that have encouraged the development of small-scale and cottage industries in Pakistan. [6]

Q) Explain why industries are often located near sources of power and water. [4]

Q) Explain the importance of good transport and communication for industrial development. [6]

Q) Explain the advantages and disadvantages of developing tourism as an industry in Pakistan. [6]

Q) Describe how industrial estates help in promoting industrial growth in Pakistan. [4]

Q) Explain why some industries in Pakistan are concentrated in Karachi. [6]

Q) Explain how global communication technologies can create new job opportunities in Pakistan. [4]

Q) Describe the main problems faced by manufacturing industries in Pakistan. [6]

Q) Explain how tourism could help increase Pakistan's GDP and employment levels. [6]

Learning Goals for Pakistan Studies/02 (Geography)

Chapter 10 Trade

6. Trade
(a) Major exports and imports
Candidates should be able to: • name the main exports and imports • describe the changes in the types/amounts/value of goods exported and imported in recent years • know and understand the meaning of GNP and GDP and the difference between them • explain the effect of changing trends in exports and imports on Pakistan's balance of trade and economy.
(b) Pakistan's trading partners
Candidates should be able to: • name and locate Pakistan's main trading partners, and name the goods Pakistan exported to them or imported from them • understand the factors which may promote or hinder trade with other countries, and explain why it is difficult for Pakistan as a developing country to maintain or increase its share of trade with other countries • understand the factors that may promote and limit trade, including trading blocs, trade barriers and currency exchange rates.

Trade is the voluntary exchange of goods, services, or assets for money or other goods, involving two or more parties who consent to the transaction.

6(a) Trade – Exports and Imports

Main Exports:

Textiles & garments (cotton yarn, cloth, towels, ready-made clothes)

Rice (especially Basmati)

Leather goods

Sports goods (e.g. footballs from Sialkot)

Surgical instruments

Fruits (mangoes, oranges)

Chemicals and cement (growing exports)

Main Imports:

Petroleum & oil products

Machinery & transport equipment

Chemicals & fertilizers

Edible oil and pulses

Iron, steel, and raw materials

Consumer goods & electronics

Recent Changes:

Exports: Rise in value-added textile products and IT services.

Imports: Increased due to energy and machinery needs for industry.

Trade deficit widened as imports > exports.

GNP vs GDP:

GDP (Gross Domestic Product): Value of goods/services produced **within Pakistan**.

GNP (Gross National Product): GDP + income earned **by Pakistanis abroad** – income earned by foreigners in Pakistan.

→ GNP > GDP because of **remittances** from overseas workers.

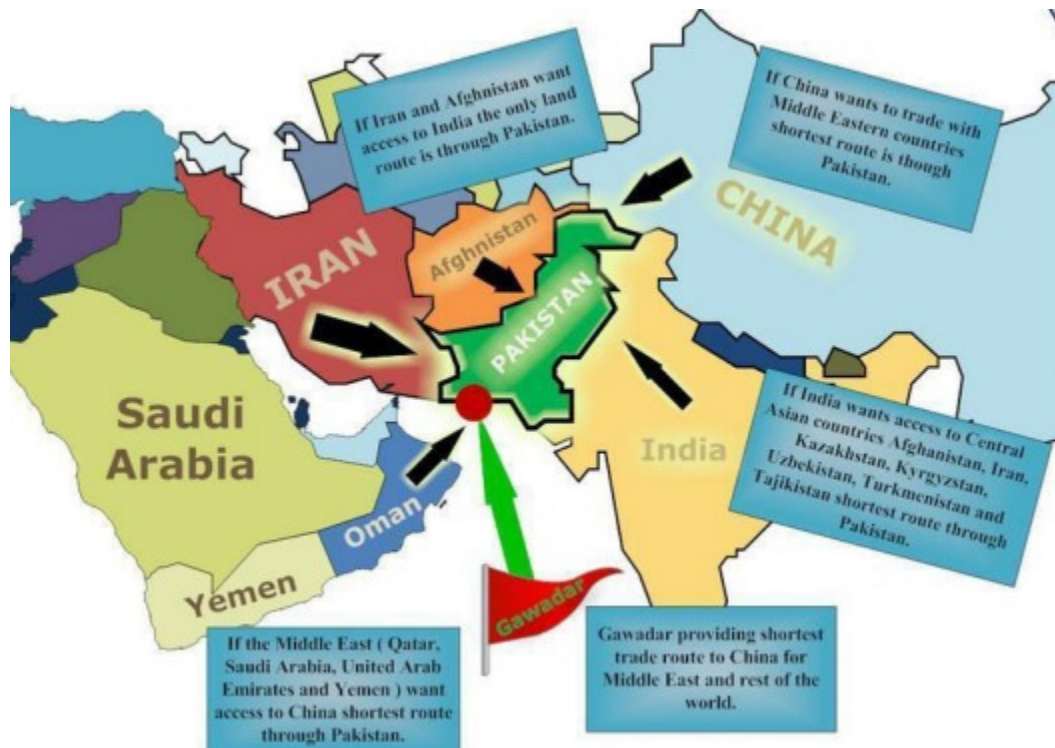
Effects of Changing Export/Import Trends:

Rising imports → **Trade deficit** (more money leaving Pakistan).

Export growth → Improves **balance of trade** and foreign exchange reserves.

Large trade deficit → Increases **foreign debt** and weakens the **rupee**.

6(b) Pakistan's Trading Partners



Main Export Partners:

USA: Textiles, leather, surgical goods.

China: Cotton yarn, rice, minerals.

UK & EU countries: Textiles, garments, sports goods.

Afghanistan & Middle East (UAE, Saudi Arabia): Food items, cement, machinery.

Main Import Partners:

China: Machinery, electronics, chemicals.

Saudi Arabia & UAE: Crude oil, petroleum products.

Japan: Vehicles, machinery.

Indonesia, Malaysia: Palm oil.

Factors Promoting Trade:

Improved **transport links** (ports, CPEC routes).

Trade agreements (e.g. with China, EU GSP+ status).

Low labour costs make exports competitive.

Growing **Pakistani communities abroad**.

Factors Hindering Trade:

Energy shortages affect industrial output.

Political instability and poor infrastructure.

High import bills (especially fuel).

Trade barriers or tariffs by other countries.

Low quality control and poor branding.

Trade Blocs & Barriers:

Trading blocs: Groups of countries with free trade (e.g. SAARC, ECO).
→ Can promote regional trade.

Trade barriers: Tariffs, quotas, or bans on goods — make exports less competitive.

Currency exchange rates:

- Weak rupee → exports cheaper, imports costlier.
- Strong rupee → exports are more expensive abroad.

Why it is difficult for Pakistan to maintain or increase its share of trade

1. **Low industrial development** – outdated technology and low productivity make exports less competitive.
2. **Limited value-added exports** – dependence on raw goods like cotton and rice instead of manufactured products.
3. **Energy shortages** – frequent power cuts disrupt production and delay export orders.
4. **Political instability and poor infrastructure** – discourage investors and slow down transport and delivery.
5. **Strong competition** – from countries like China, India, and Bangladesh with cheaper, better-quality goods.
6. **Trade barriers and global standards** – high tariffs and strict quality rules in developed countries restrict access to markets.

Export Processing Zones in Pakistan

1. Karachi EPZ

Main focus: Textiles, garments, electronics, chemicals, packaging.

Functions:

- Oldest and largest EPZ (set up in 1981).
- Handles diverse export industries due to port access.

- Provides warehousing and transport links through Karachi Port.

2. Sialkot EPZ

Main focus: Sports goods, surgical instruments, leather products.

Functions:

- Supports Sialkot's existing export industries.
- Encourages small-scale manufacturers to access international markets.
- Promotes skilled-based, high-quality goods production.

3. Risalpur EPZ

Main focus: Light engineering, machinery, and metal works.

Functions:

- Uses skilled labour from Khyber Pakhtunkhwa.
- Encourages engineering exports and industrial diversification.

4. Gujranwala EPZ

Main focus: Ceramics, electrical goods, sanitary fittings, and fan manufacturing.

Functions:

- Builds on local manufacturing strengths.
- Aims to improve product quality for export markets.

5. Saindak EPZ

Main focus : Mineral and metal processing (especially copper and gold).

Functions:

- Located near mining sites in Balochistan.
- Processes minerals locally to add value before export.
- Promotes regional development in a remote area.

World Trade Organization (WTO) and Pakistan

What it is:

The **WTO** is a global organization that promotes **free and fair trade** between countries by reducing **tariffs, quotas, and trade barriers**.

Pakistan became a **member in 1995**.

Functions and Role for Pakistan

1. Promotes fair trade:

Helps Pakistan access international markets under equal trading rules.

2. Reduces trade barriers:

Encourages other countries to lower tariffs on Pakistani exports like textiles and rice.

3. Resolves disputes:

Pakistan can appeal to the WTO if another country imposes unfair restrictions on its goods.

4. Encourages reforms:

Motivates Pakistan to modernize industries and follow international trade standards.

5. Supports exports:

By ensuring a more stable global trading environment, the WTO helps Pakistan **expand its exports** and attract **foreign investment**.

In short:

The **WTO helps Pakistan trade more freely and fairly** with other countries, though Pakistan still faces challenges like competition and meeting quality standards.

Trade Development Authority of Pakistan (TDA or TDAP)**What it is:**

The **Trade Development Authority of Pakistan (TDAP)** was established in **2006** to **promote and develop Pakistan's exports**.

It works under the **Ministry of Commerce**.

Functions of TDAP**1. Promotes exports:**

Helps Pakistani businesses find **new international markets** and increase exports.

2. Organizes trade fairs and exhibitions:

Arranges **trade shows** at home and abroad to showcase Pakistani products (like textiles, sports goods, and handicrafts).

3. Supports exporters:

Provides **training, information, and guidance** to exporters about foreign markets and trade laws.

4. Advises the government:

Suggests **policies and strategies** to improve Pakistan's trade performance.

5. Improves product quality:

Encourages industries to meet **international standards** for quality and packaging.

6. Attracts investment:

Promotes **foreign trade partnerships** and helps build Pakistan's image as a reliable trading nation.

Past Paper Questions

- Q) Why are dry ports important to the economy of Pakistan? [3]
- Q) Explain how cotton can be exported as a primary, a processed and a manufactured product. [3]
- Q) State two methods of telecommunication. [2]
- Q) Explain how telecommunication can be used to improve the supply of goods, and increase trade in Pakistan and abroad. [6]
- Q) Explain why Pakistan will need to continue to import wheat. [2]
- Q) How can Pakistan increase foreign exchange earned by trading with a country or trading block such as SAARC or the EU? [3]
- Q) Why does Pakistan need to increase its foreign exchange? [3]
- Q) Sports and other manufactured goods are transported by air, sea and road both in Pakistan and across the world. Name two methods of transport used for the export of sports goods from Pakistan. For each method, explain its advantages and disadvantages. [6]
- Q) From the list below state two imports and two exports. [2]
- COTTON MACHINERY WHEAT IRON ORE LEATHER CRICKET BATS SURGICAL EQUIPMENT COMPUTERS**
- Q) The European Union (EU) is a major trading partner of Pakistan. Name two countries in this trading community. [2]
- Q) Why is it important that Pakistan trades both imports and exports with the EU? [2]
- Q) The countries of the European Union have a large demand for goods such as clothes and sports goods. Pakistan can produce these goods cheaply. Explain the advantages and disadvantages of developing a trade agreement with partners in the EU. [4]
- Q) Name, in order of importance, Pakistan's three main importing and exporting ports. [4]

Learning Goals for Pakistan Studies/02 (Geography)

Chapter 11 Transport & Telecommunications

7. Transport and telecommunications
(a) Internal transport
Candidates should be able to: - interpret maps to describe the regional variations in the density and pattern of the road, rail and air transport networks within Pakistan - explain the factors which help and hinder the location, maintenance and development of roads, railways and airports - describe improvements that have recently taken place in road, rail and air communications, and consider the feasibility of new developments - compare the advantages and disadvantages of road, rail and air transport within Pakistan for both goods and people - evaluate the development of new transport schemes, including motorway and airport development.
(b) International transport
Candidates should be able to: - identify on a map those roads (including the name of the pass they use, where relevant) and railways which cross the international boundary and are in use for at least part of the year - identify on a map the ports of Keamari, Qasim and Gwadar, and the cities with international airports - explain the factors which affect the location and development of cross-border roads and railways, seaports, dry ports and airports - explain what is meant by the term <i>dry port</i>, name an example of one and explain why they have been developed in many cities of Pakistan.
(c) Telecommunications
Candidates should be able to: - explain the importance of radio, television, phones, fax machines, emails and the internet in the fields of education, industry, services and trade - understand the problems of providing telecommunications in some parts of Pakistan - evaluate the role of telecommunications in the development of Pakistan.

(a) Internal Transport

1. Regional Variations and Patterns (based on maps)

Roads

Most dense in Punjab and Sindh — due to flat land, industries, high population, and fertile agricultural areas.

Sparse in Balochistan and Northern Areas — mountainous terrain, low population density, and poor weather conditions.

Main highways:

- **N-5 (Grand Trunk Road):** Karachi → Hyderabad → Multan → Lahore → Rawalpindi → Peshawar.
- **N-25 (RCD Highway):** Karachi → Quetta → Taftan (Iran border).
- **Motorways:** M-1 (Peshawar–Islamabad), M-2 (Islamabad–Lahore), M-3 (Lahore–Multan), M-4 (Faisalabad–Multan), M-5 (Multan–Sukkur).

Railways

Main rail network lies in **Punjab and Sindh plains** — easy to build on flat land.

Sparse in **northern and western Pakistan** because of rugged mountains and deserts.

Main Line (ML-1): Karachi → Hyderabad → Rohri → Multan → Lahore → Rawalpindi → Peshawar.

Branch lines: Link smaller towns (e.g., Quetta–Zhob, Rohri–Quetta).

Air Transport

Used for **long-distance travel** and **remote areas** (mountain valleys).

Major airports: Karachi (Jinnah), Lahore, Islamabad, Peshawar, Quetta.

Small airports/airstrips: Skardu, Gilgit, Chitral (for northern areas).

2. Factors Affecting Location, Maintenance, and Development

Helping Factors

Flat land in Punjab/Sindh → easy and cheap construction.

High population&industry → strong transport demand.

CPEC investment → new highways and rail upgrades.

Foreign aid (ADB, China) for infrastructure projects.

Economic zones → need for good connectivity.

Hindering Factors

Mountainous terrain (North and Balochistan) → expensive and difficult to build/maintain.

Natural hazards — floods, landslides, and earthquakes.

Lack of funds → poor maintenance, delays in expansion.

Corruption and mismanagement → inefficiency.

Fuel shortages and old vehicles raise costs.

3. Recent Improvements

Road: CPEC highways and

motorways built for trade with China.

Lahore Ring Road, Karachi Northern Bypass , and other expressways developed.

Rail: ML-1 railway

upgrade under CPEC — double tracks, higher speed trains.

Freight train revival for bulk goods.

Air:

New Islamabad International Airport (2018) — Pakistan's largest.

Modernization of **Karachi, Lahore, and Multan** airports.

New **domestic routes** for tourism (Skardu, Gilgit).

4. Advantages and Disadvantages

Transport Type	Advantages	Disadvantages
Road	Flexible, door-to-door, suitable for short distances, easy to construct	Traffic congestion, accidents, pollution, high maintenance
Rail	Cheap for long-distance and bulk goods, less pollution, fewer accidents	Slow, old trains, limited network, poor service
Air	Fastest, connects remote areas, good for business and perishable goods	Expensive, affected by weather, limited cargo capacity

5. Evaluation of New Schemes

Motorway Development

Advantages: Reduces travel time, promotes trade, tourism, and CPEC logistics.

Disadvantages: High construction cost, tolls unaffordable for many, benefits mainly urban areas.

Airport Development

Advantages: Boosts business, tourism, and international connectivity.

Disadvantages: High maintenance costs, underuse in smaller cities, needs skilled staff.

(b) International Transport

1. Cross-Border Roads and Railways (MAPS REQUIRED)

Route / Pass	Connects With	Details
Karakoram Highway (Khunjerab Pass)	China	Part of CPEC; all-weather road linking Gilgit–Hunza to Kashgar (China).
Khyber Pass	Afghanistan	Oldest trade route via Peshawar–Torkham–Kabul.
Chaman Road	Afghanistan	Connects Quetta to Kandahar.
Taftan Road & Rail Link	Iran	Links Quetta to Zahidan (Iran) via N-40 highway.

2. Seaports (MAPS REQUIRED)

Port	Location	Main Functions
Karachi Port (Keamari)	Sindh coast	Oldest and busiest port; handles oil, machinery, food, and containers.

Port Qasim	Near Karachi	Industrial port for steel, fertilizer, and oil; deep-water capacity.
Gwadar Port	Balochistan coast	Deep-sea port; gateway for trade with Central Asia via CPEC.

3. International Airports (MAPS REQUIRED)

Karachi (Jinnah International)

Lahore (Allama Iqbal International)

Islamabad International Airport

Peshawar (Bacha Khan International)

Quetta, Multan, Faisalabad, Sialkot

4. Dry Ports

Definition:

Inland customs facility where goods are imported/exported without needing to go to seaports.

Examples:

Lahore Dry Port –serves central Punjab.

Faisalabad Dry Port – textile exports.

Sialkot Dry Port – sports and surgical goods.

Peshawar Dry Port – trade with Afghanistan.

Reasons for Development:

Save time and cost for inland exporters.

Reduce congestion at Karachi Port.

Support industries far from the sea.

5. Factors Affecting Transport Location and Development

Natural: Terrain, climate, and distance from coast.

Economic: Proximity to industries and markets.

Political: Cross-border relations and stability.

Strategic: Defence and trade routes (CPEC).

(c) Telecommunications

1. Importance

Education: Distance learning, online classes, access to knowledge.

Industry: Coordination, e-commerce, marketing, and online management.

Services: Banking, health care, call centers, logistics.

Trade: Export communication, online orders, payments.

2. Problems

Rural and mountain areas lack signal coverage.

Power shortages interrupt service.

High equipment cost and poor literacy reduce use.

Cybersecurity and reliability issues.

3. Role in Development

Improves **economic growth** through e-commerce and IT exports.

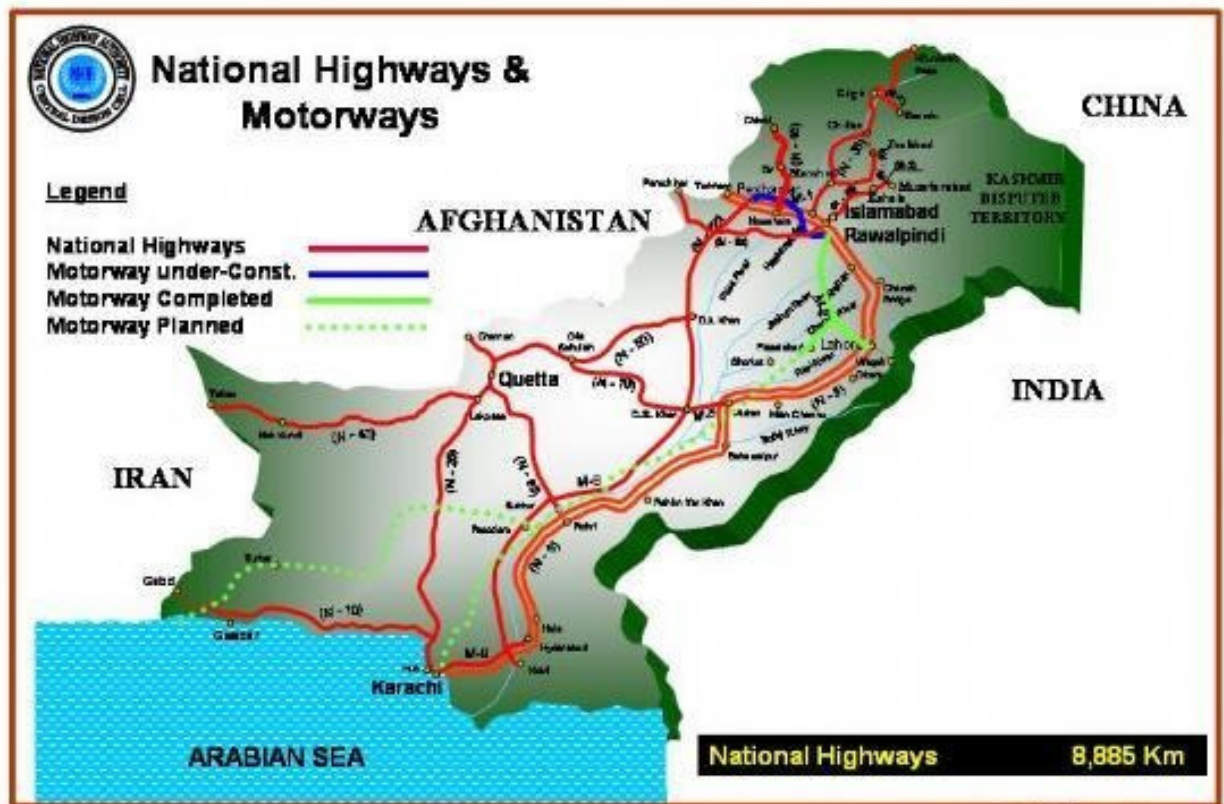
Expands **education and awareness.**

Creates **jobs** in telecom and IT sectors.

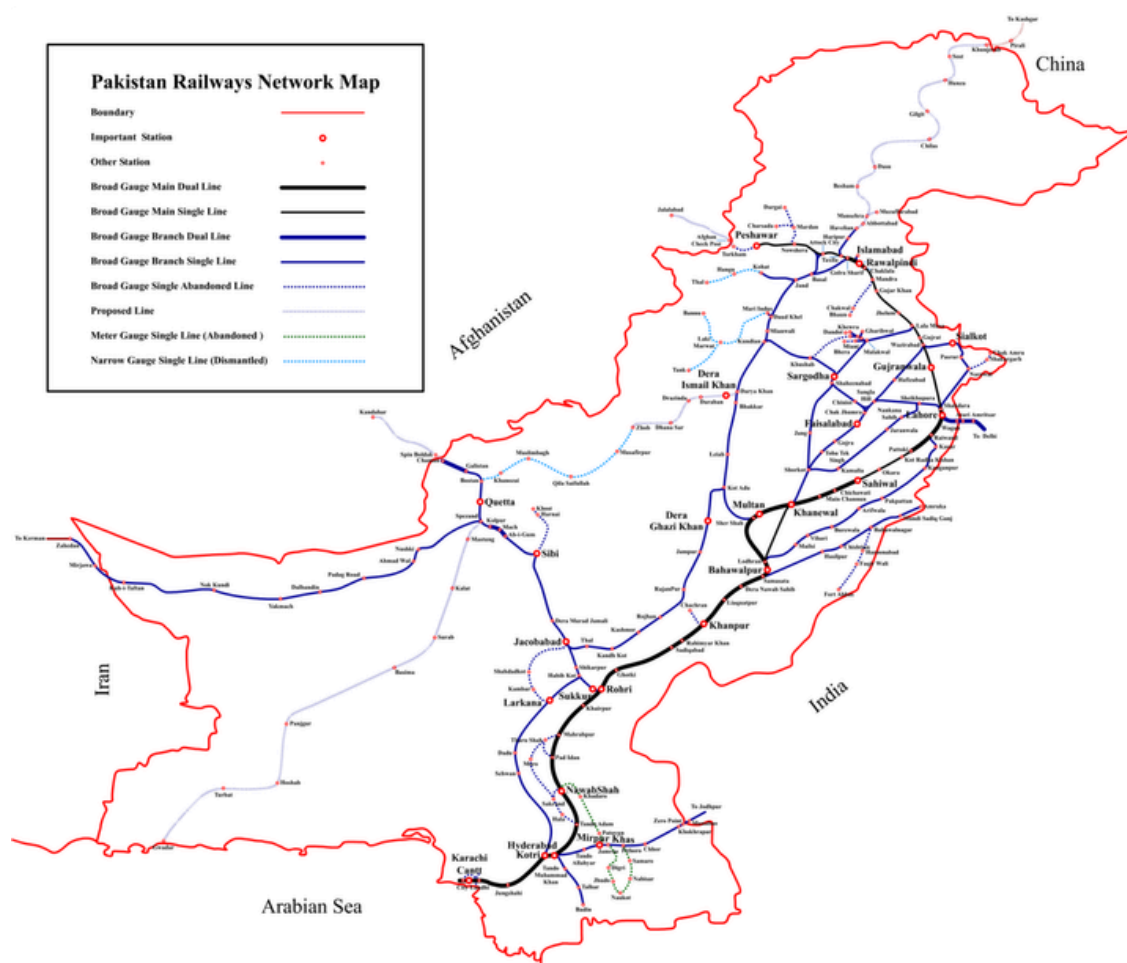
Enhances **governance** (e.g., NADRA, e-governance).

Connects **rural areas** to cities and markets.

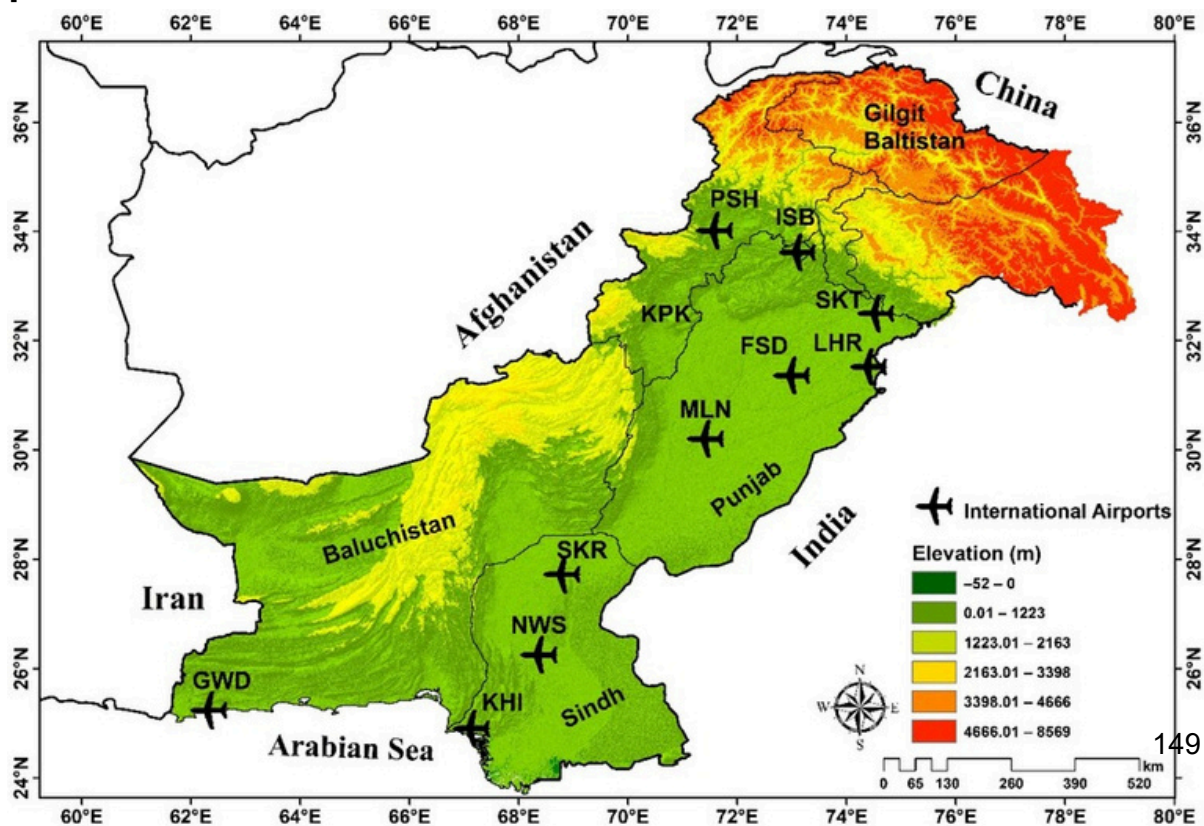
Maps To Know:



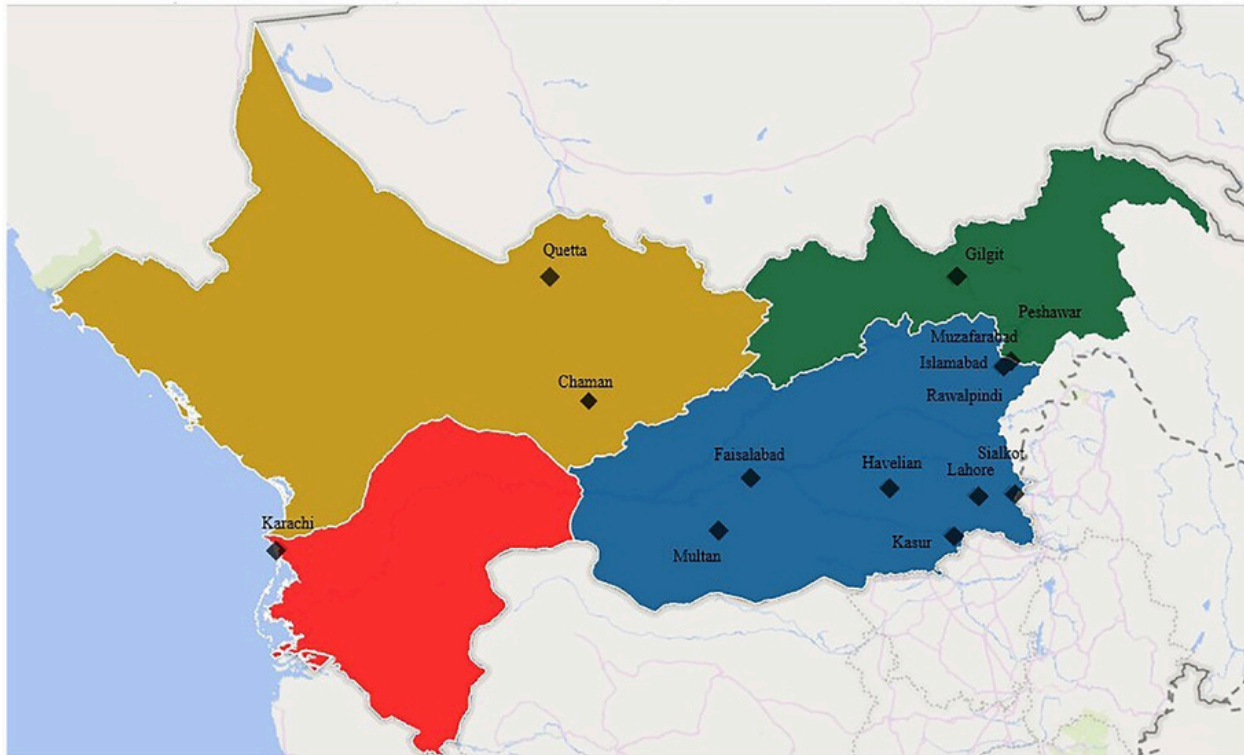
PakWheels.com



Airports



Dry Ports



Past Paper Questions:

Internal Transport

Q) Explain the advantages and disadvantages of road transport in Pakistan for both goods and people.

Q) Why are roads more developed in Punjab and Sindh than in Balochistan and the Northern Areas?

Q) Describe the main problems faced by Pakistan Railways, and suggest how these could be improved.

Q) Explain the factors that help or hinder the construction and maintenance of roads in Pakistan.

Q) Describe recent improvements made in road and rail transport in Pakistan.

Q) Evaluate the advantages and disadvantages of motorway development for Pakistan's economy and environment.

International Transport

Q) Explain the factors affecting the location and development of seaports in Pakistan.

Q) Describe the importance of Gwadar Port for Pakistan's economy and trade.

Q) What is a dry port? Explain why they have been developed in many cities of Pakistan.

Q) Discuss the advantages of developing new airports for Pakistan's trade and tourism.

Q) Explain why cross-border roads and railways are important for Pakistan's economy.

Telecommunications

Q) Explain the importance of telecommunications (e.g., internet, mobile phones, TV) in education, industry, and trade in Pakistan.

Q) Describe the problems of providing telecommunication services in remote areas of Pakistan.

Q) Explain how improved communication systems have contributed to Pakistan's economic development.

Q) "Telecommunications are more important than transport for Pakistan's development."

– How far do you agree? Give reasons for your answer.

Q) How has the growth of mobile phones and the internet helped businesses and industries in Pakistan?

Learning Goals for Pakistan Studies/02 (Geography)

Chapter 12 Population

(a) Structure and growth

Candidates should be able to:

- understand the changing population structures (both age and sex) as shown by population pyramids for Pakistan
- explain and evaluate the effects of the present and projected population structures on the economy and development of Pakistan
- interpret graphs and statistics illustrating birth rates, death rates and the rates of natural increase in Pakistan, and identify trends in population growth
- explain the social, educational, economic and political factors which contribute to population growth over time
- explain the problems for development caused by population growth over time, consider its sustainability and evaluate possible solutions to these problems.

(b) Movements of population

Candidates should be able to:

- describe and explain, with reference to both 'push' and 'pull' factors, the main causes of population movements, including rural-urban migration, seasonal migration, emigration and immigration (including refugees)
- describe and explain the effects of these population movements, including shanty developments in cities, tent cities and the de-population of rural areas
- understand the effects of population movements and evaluate the measures which may be taken to help solve the problems created, such as self-help schemes, provision of clean water and other services (including adverse outcomes such as poor housing).

(c) Distribution and density of population

Candidates should be able to:

- distinguish between *distribution of population* and *density of population*
- recognise the variations in both distribution of population and density of population between the Provinces (including the Northern Area) and within the Provinces (including within the Northern Area)
- explain the physical, economic, social and political factors which contribute to these variations.

(d) Employment

Candidates should be able to:

- define the terms *primary*, *secondary* and *tertiary* in relation to occupations
- describe and explain the proportions of the workforce engaged in each of the primary, secondary and tertiary sectors, and any changes in these proportions that may have taken place or may be taking place
- understand and explain the causes of rural and urban unemployment and underemployment (that is, people who are not fully employed), and understand the problems for development created by underemployment and unemployment
- describe and explain the availability of skilled labour (people qualified for the professions, for management and as technicians, etc.) and manual labour
- understand that unemployment and underemployment can be factors that influence GNP and GDP
- understand and evaluate the importance for Pakistan's development of literacy, education and training for both males and females, in rural as well as urban areas.

1. Population structure

Population pyramid: shows the age and sex structure of Pakistan's population.

Pakistan has a **broad base** (many children) and a **narrow top** (few elderly), showing **high birth rate** and **low life expectancy**.

More **males than females**, especially in working-age groups, due to migration and cultural factors.

2. Trends and changes

Birth rate: high but **falling slowly** due to education, family planning, and urbanisation.

Death rate: low and decreasing because of **better healthcare, sanitation, and vaccines**.

Natural increase: still high (2%+ annually), leading to **rapid population growth**.

Population doubling time: about **30–35 years**.

3. Causes of population growth

Social: preference for large families, especially sons.

Educational: low literacy, especially for women, leading to less awareness of birth control.

Economic: children seen as assets to work and support families.

Political: governments have been slow to enforce population policies due to cultural sensitivity.

4. Effects on economy and development

Strain on resources: pressure on food, water, housing, and jobs.

Unemployment and poverty increase.

Overcrowded cities (Karachi, Lahore, Islamabad).

Pressure on education and healthcare systems.

Difficult to improve **GDP per capita** because population grows faster than the economy.

5. Solutions and population control

Promote **family planning** and **awareness campaigns** (e.g. Greenstar, Family Planning Association).

Increase **female literacy and employment**.

Encourage **late marriage** and **smaller families**.

Improve **rural healthcare and education**.

Provide **economic incentives** for fewer children.

(b) Movements of Population

1. Types of movement

Rural–urban migration: from villages to cities like Karachi, Lahore, Islamabad for jobs and services.

Seasonal migration: agricultural workers move temporarily for harvests or construction.

Emigration: workers go abroad (mainly to Gulf countries).

Immigration: refugees enter Pakistan (mainly from Afghanistan).

2. Push factors (from rural areas)

Unemployment and poverty.

Lack of schools, hospitals, and services.

Droughts, floods, and poor living conditions.

3. Pull factors (towards cities)

Better jobs, education, and healthcare.

Higher wages and improved living standards.

Modern lifestyle and facilities.

4. Effects of migration

Urban areas: overpopulation → slums/shanty towns (e.g. Orangi Town, Karachi); poor sanitation; unemployment.

Rural areas: depopulation, shortage of farm labour, less productivity.

Foreign migration: brings **remittances** (foreign currency) but also **brain drain**.

5. Solutions

Self-help housing schemes (e.g. Orangi Pilot Project).

Rural development: schools, jobs, healthcare to reduce rural-urban migration.

Industrial decentralisation: industries in small towns and villages.

Better **urban planning and public transport**.

(c) Distribution and Density of Population

1. Definitions

Population distribution: how people are spread out.

Population density: number of people per square kilometre.

2. Variations between regions

Densely populated: Punjab and Sindh plains (fertile land, irrigation, jobs).

Moderately populated: Khyber Pakhtunkhwa valleys.

Sparsely populated: Balochistan, Northern Areas, deserts (harsh climate, poor soil, lack of water).

3. Factors affecting distribution

Physical: flat fertile land, moderate climate, water availability, fewer natural hazards → higher density.

Economic: industry, trade, and transport attract population (Karachi, Lahore, Faisalabad).

Social: better services, schools, hospitals.

Political: safer and more stable areas attract settlement.

(d) Employment

1. Employment sectors

Primary: farming, fishing, forestry, mining (~40–45% of labour force).

Secondary: manufacturing and industry (~20%).

Tertiary: services (education, trade, transport, healthcare) (~35–40%).

2. Changes over time

Fewer people in **agriculture**, more in **industry and services** due to urbanisation and education.

Still, most jobs are **low-skilled** and **informal**.

3. Unemployment and underemployment

Rural unemployment: landless farmers, seasonal jobs, mechanisation reduces labour demand.

Urban unemployment: too many migrants, few skilled jobs, slow industrial growth.

Underemployment: people working part-time or below skill level (common in rural areas).

4. Problems caused

Low income and poverty.

Crime and social unrest.

Pressure on urban services.

Slower economic growth (lower GNP/GDP).

5. Skilled and manual labour

Shortage of **skilled labour** (engineers, technicians) due to brain drain.

Surplus of **unskilled labour** → low productivity.

Need to expand **vocational and technical education**.

6. Role of education and training

Literacy and education improve productivity and innovation.

Female education increases workforce participation and lowers birth rates.

Technical training builds skilled labour for industrial growth.

Essential for raising **GDP and living standards**.

Past Paper Questions:

Population Structure and Growth

- Q) Explain why Pakistan's population growth rate remains high despite falling birth and death rates.**

- Q) Describe the social and economic effects of Pakistan's rapidly growing population.**

- Q) Explain how the age structure of Pakistan's population affects education and employment needs.**

- Q) Discuss the advantages and disadvantages of a youthful population for a developing country like Pakistan.**

- Q) Explain the main factors responsible for the high birth rate in Pakistan.**

- Q) Evaluate the measures taken by the government to control population growth.**

- Q) How does rapid population growth affect the economy and environment of Pakistan?**

Movements of Population

- Q) Explain the push and pull factors that cause rural-urban migration in Pakistan.**

Q) Describe the effects of rural-urban migration on both rural and urban areas.

Q) Explain the problems caused by migration in major cities like Karachi or Lahore.

Q) Describe the effects of emigration (workers leaving to Gulf countries) on Pakistan's economy.

Q) What are the advantages and disadvantages of seasonal migration in Pakistan?

Q) Discuss solutions to reduce the problems caused by population movements in Pakistan.

Q) Explain how refugee migration from Afghanistan has affected Pakistan.

Distribution and Density of Population

Q) Describe and explain the variations in population density between provinces in Pakistan.

Q) Explain why Punjab is the most densely populated province in Pakistan.

Q) Why do Balochistan and Northern Areas have a low population density?

Q) Explain how physical and economic factors influence where people live in Pakistan.

Q) “Economic factors are more important than physical factors in influencing population distribution.”

– How far do you agree? Give reasons.

Employment

Q) Define primary, secondary, and tertiary occupations with examples from Pakistan.

Q) Explain the changes in the employment structure of Pakistan over recent years.

Q) Why is there a high level of rural unemployment in Pakistan?

Q) Explain the causes and effects of urban unemployment in Pakistan.

Q) What is underemployment? Explain its causes and problems in Pakistan.

Q) Explain the importance of skilled labour for Pakistan’s development.

Q) How does education and literacy affect employment opportunities?

Q) Explain the relationship between employment, productivity, and GDP/GNP.

**Q) “Improving education is the key to reducing unemployment in Pakistan.”
–How far do you agree? Give reasons.**

Resources Used for Compilation of Notes

(ii) Environment of Pakistan (Paper 2)

The Environment of Pakistan *By Huma Naz Sethi*
Pakistan: The Environment, Economy and People *By David Davies*
Exploring Geography of Pakistan – Fauzia Ayesha
Geography of Pakistan – Fazle Karim Khan
Oxford School Atlas (Pakistan Edition) – Oxford University Press
Philip’s Modern School Atlas – Philip’s Publishing

Cambridge International Marking Schemes, Examiner Reports and Sample Candidate Responses were also taken into account during compilation.