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ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD

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Assignment No. 2 (Units 5-9)

SOLVED ASSIGNMENT GUIDE

(For Study & Reference)

Note: This guide is prepared for study and reference purposes. Students are advised to read the relevant units of the course book, understand the concepts, and then write the assignment in their own words.

Question 1: Soil and the Classification of Soils of Pakistan (20 Marks)

Define soil and explain the classification of soil of Pakistan.

Introduction

Soil is the thin skin of the earth on which almost all land life depends. It is only a few centimetres to a few metres deep, yet it feeds the crops that feed mankind, supports forests and grazing lands, and holds the water that plants need between rains. For an agricultural country like Pakistan, where the majority of the people still depend directly or indirectly on farming, the nature and distribution of soils is a subject of first importance. Pakistan's soils are as varied as its landscape: deep fertile alluvium in the Indus plain, thin stony soils in the mountains, saline soils in waterlogged canal areas, and thirsty sands in the deserts. This answer

first defines soil and describes how it is formed, and then explains the classification of the soils of Pakistan.

Definition of Soil

Soil may be defined as the uppermost layer of the earth's crust, formed by the weathering of rocks and the decay of organic matter, which is capable of supporting plant life. In the words of soil scientists, soil is a natural body on the surface of the earth, composed of mineral matter, organic matter (humus), water and air, in which plants grow. A more geographical definition states that soil is the product of the interaction of parent rock, climate, relief, organisms and time — the five factors of soil formation. Each factor leaves its mark. The parent rock supplies the mineral skeleton: soils formed from Indus alluvium differ from those formed from Salt Range limestone. Climate, through temperature and rainfall, controls the speed of weathering and the amount of leaching. Relief decides whether soil is deep (on flat plains) or thin (on steep slopes from which it is washed away). Living organisms — roots, bacteria, worms and man himself — mix and enrich the soil, while time allows a mature soil profile, with its distinct layers or horizons, to develop.

A good agricultural soil is not simply crushed rock. It contains roughly half mineral matter, with the remainder made up of water, air and a small but vital proportion of humus, which gives the soil its dark colour, its fertility and its ability to hold moisture and plant foods such as nitrogen, phosphorus and potassium. The texture of the soil — the proportions of sand, silt and clay in it — decides how easily it can be ploughed, how well it drains and which crops it suits. Loam, a

balanced mixture, is generally the best farming soil. With this background, the soils of Pakistan can now be classified.

Classification of the Soils of Pakistan

The soils of Pakistan are classified in two related ways: by their mode of formation and the material from which they are made (alluvial, residual, desert, mountain soils and so on), and, within the great Indus plain, by their age and position. The following are the main classes.

1. Indus Plain (Alluvial) Soils

These are by far the most important soils of Pakistan, covering the Punjab and Sindh plains. They are formed from the silt carried down by the Indus and its tributaries and deposited over thousands of years. Because the river material is mixed and renewed, these soils are generally fertile, deep and easy to work, though often low in organic matter and nitrogen. Two main types are recognised. Old alluvial soils (Bangar) occupy the higher ground of the doabs, away from present flooding; they are more mature, sometimes containing lime nodules (kankar), and are the main canal-irrigated soils on which wheat, cotton, sugarcane and maize are grown. New alluvial soils (Khadar) occupy the active flood plains (bet lands) along the rivers, where fresh silt is deposited by floods; they are very fertile and especially suited to rice, fodder and vegetables, though subject to flooding. In Sindh, similar alluvial soils extend across the lower plain, where, however, salinity is a widespread problem.

2. Saline and Sodic Soils (Kallar Soils)

In large parts of the canal-irrigated plains, especially in central Punjab and Sindh, evaporation of irrigation and groundwater has left salts on or near the surface, producing saline and sodic soils, locally called kallar or thur. White salt crusts (saline soils) or hard, structureless, alkaline soils (sodic soils) make farming difficult or impossible; millions of hectares have been damaged in this way, in association with waterlogging. These soils are classified separately because they need special reclamation: leaching with good water and drainage for saline soils, and the application of gypsum followed by leaching for sodic soils, after which salt-tolerant crops such as rice, barley and dhaincha can begin the recovery.

3. Sandy (Desert) Soils

The soils of Thar, Cholistan, Thal and the Kharan desert are sandy soils formed under very low rainfall and high temperatures. They are light, loose, poor in humus and plant food, and unable to hold moisture; wind constantly moves them into dunes. Where rain falls or where irrigation reaches them — as at the edges of Cholistan under canal extension — they can produce millets, guar, pulses and fodder, and Thar produces good grazing after rains. Their classification reflects their aridity: they are soils in which climate, not parent material, is the dominant influence.

4. Loess and Plateau Soils of Potohar

The Potohar plateau is covered in many places by loess — fine wind-blown silt deposited in past ages — forming silty, fairly fertile soils where they have not been eroded. However, rainfall in Potohar is concentrated in heavy monsoon showers, and generations of runoff have cut the plateau into ravines and gullies (the badland topography around the plateau edges), so erosion

is the chief problem. These soils support rain-fed (barani) farming of wheat, groundnut, maize and fodder, and their management centres on soil conservation: terracing, check dams and tree planting.

5. Mountain and Hill Soils

In the northern and western mountains the soils are residual soils formed in place from the underlying rocks. They are generally thin, stony and immature, because slopes are steep and erosion removes material almost as fast as it forms; they become deeper and richer under forests, where leaf litter adds humus. Such soils carry the coniferous forests of the north, alpine pastures above them, and terraced farming of maize, potatoes and fruit where slopes permit. In the dry western hills and the Balochistan plateau, soils are thin, gravelly and often limy, supporting only sparse grazing and dry farming of wheat and fruits in favoured valleys, with valley-bottom alluvium providing small pockets of better land.

6. Deltaic and Coastal Soils

In the Indus delta and along the coast, soils are young alluvial and tidal soils, frequently saline because of sea-water intrusion, and covered in places by mangrove swamps. They are used for rice where fresh water reaches them, for grazing and for mangrove forestry, which protects the coast and breeds fish and shrimps. Rising salinity as river flows below Kotri have declined is a serious threat to these soils.

Table 1: Classification of the soils of Pakistan

Soil Class	Main Areas	Chief Characteristics	Main Uses / Crops
Old alluvial (Bangar)	Punjab and Sindh doabs,	Deep, mature,	Wheat, cotton,

	higher plain	sometimes kankar; canal irrigated	sugarcane, maize
New alluvial (Khadar)	Flood plains along Indus and tributaries	Fresh silt every flood; very fertile	Rice, fodder, vegetables
Saline / sodic (kallar)	Waterlogged canal areas of Punjab & Sindh	Salt crusts or alkaline, hard; needs reclamation	Reclaimed with gypsum, drainage; rice, barley
Sandy desert soils	Thar, Cholistan, Thal, Kharan	Loose sand, dunes, very low humus and moisture	Millets, guar, grazing; farming where irrigated
Loess / Potohar soils	Potohar plateau	Silty loess, badly gully-eroded	Barani wheat, groundnut, maize
Mountain soils	Northern & western mountains	Thin, stony, richer under forest	Forests, pastures, terraced maize, fruit
Deltaic / coastal soils	Indus delta, coastal belt	Young, often saline, mangrove swamps	Rice, grazing, mangroves

Main Soil Problems of Pakistan

A classification is useful only if it points to management, and Pakistan's soils suffer from well-known problems. Soil erosion by water in the northern hills and Potohar, and by wind in the deserts, removes the fertile top layer. Waterlogging and salinity have damaged large areas of the canal commands. Most Pakistani soils are low in organic matter and nitrogen because of the hot climate, intensive cropping and the burning or removal of crop residues and dung. Continuous cropping without balanced fertilisation mines the soil of phosphorus, potassium and micronutrients such as zinc. The solutions follow from the diagnosis: drainage and gypsum for salt-affected soils, conservation works and tree planting on eroded lands, green manuring, compost and balanced fertilisers to restore fertility, and crop rotations with legumes.

Conclusion

To conclude, soil is the weathered upper layer of the earth's crust, composed of mineral and organic matter, water and air, formed by the action of rock, climate, relief, organisms and time, and capable of supporting plant life. Pakistan's soils are classified principally into the alluvial soils of the Indus plain — old Bangar and new Khadar — saline and sodic kallar soils, sandy desert soils, loess soils of Potohar, thin mountain and hill soils, and deltaic and coastal soils. Each class has its own fertility, problems and best use. A scientific knowledge of this classification is the foundation of good farming, land reclamation and land-use planning in Pakistan.

Question 2: Production of Rice in Pakistan and the Fishing Industry in Pakistan (10 + 10 Marks)

Explain the following: (i) Production of rice in Pakistan. (ii) Fishing industry in Pakistan.

Introduction

Rice and fish belong together in the geography of Pakistan more closely than might at first appear: both are products of water — rice of the flooded fields of the Indus plain, and fish of the rivers, lakes, reservoirs and the Arabian Sea. Rice is one of Pakistan's great export earners and the staple food of Sindh and much of the coastal population, while fisheries provide protein, employment and a growing export of fish and shrimp. This answer treats the two topics in turn: first the production of rice in Pakistan, its requirements, regions, varieties,

importance and problems; and then the fishing industry, its branches, centres, importance, problems and prospects.

Part (i): Production of Rice in Pakistan

Geographical Requirements of Rice

Rice is a kharif crop of hot, wet lowlands. It needs a high temperature — generally above 20 to 25 degrees Celsius through the growing season — abundant water standing in the fields for much of its life, and a level, heavy soil that can hold that water. Ideal conditions are a clayey loam soil, a flat surface that can be bunded into small flooded plots, plentiful irrigation where rainfall is short, and cheap abundant labour for transplanting, weeding and harvesting, because rice is one of the most labour-intensive of crops. Pakistan's monsoon summer supplies the heat, the Indus canal system supplies the water, and the flat alluvial soils of Punjab and Sindh supply the land — which is why Pakistan, although much drier than the classic rice lands of Bengal or South-East Asia, can be a major rice producer through irrigation.

Producing Regions and Varieties

Rice is grown in all four provinces, but production is concentrated in two belts. In Punjab, the famous rice tract lies in the north-east — Gujranwala, Sheikhupura, Sialkot, Hafizabad, Narowal and Lahore districts — where canal water from the Chenab and Ravi and monsoon rain combine; this is the home of Basmati, the long-grained aromatic rice for which Pakistan is world-famous and which commands the highest export prices. In Sindh, the rice belt lies in upper and central Sindh — Larkana, Jacobabad, Shikarpur, Dadu, Qambar-Shahdadkot and

Badin — irrigated from the Sukkur, Guddu and Kotri barrages; Sindh grows mainly the coarser IRRI-type varieties, which give high yields and are preferred for some export markets and domestic use. Smaller areas are grown in the Dera Ismail Khan region and Naseerabad division of Balochistan (the 'rice bowl' of that province, irrigated by the Pat Feeder Canal) and in parts of Khyber Pakhtunkhwa such as Swat and Bannu for local consumption.

Pakistan's rice production in recent years has been roughly in the range of eight to nine million tonnes of paddy from around three million hectares, though it fluctuates with water availability and floods — the 2022 floods, for example, badly damaged the Sindh crop. The average yield per hectare, however, remains below that of leading producers such as China and Egypt, which indicates the room for improvement through seed, water management and mechanisation.

Importance of Rice

Rice is Pakistan's second most important food crop after wheat and one of its top export commodities, commonly earning around two to three billion US dollars a year and in strong years more. Basmati exports go chiefly to the Middle East, Europe and East Africa, while IRRI rice is exported widely to Africa and other price-sensitive markets. Within the country, rice is the staple diet of Sindh and the coastal belt and a popular food everywhere; its straw feeds livestock, its husk fuels rice mills and brick kilns, and its milling, trading and exporting employ a large number of people in the rice districts and at Karachi port. The crop also fits the kharif season and the canal system, using summer water that would otherwise flow to the sea.

Problems and Suggestions

The rice economy faces several problems. Water is the first: rice is a thirsty crop grown in a water-scarce country, and traditional continuous flooding wastes water; methods such as direct seeding, alternate wetting and drying, and laser land levelling can save large quantities. Second, yields are held down by old seed, imbalanced fertiliser use, pests and diseases and late transplanting. Third, the harvesting and milling chain suffers losses, and Pakistani Basmati faces competition from India in world markets, including disputes over the Basmati name and geographical indication. Fourth, floods and heat waves under a changing climate threaten the Sindh and Punjab belts. The remedies follow naturally: research on high-yielding, water-saving and flood-tolerant varieties; extension advice on seed and fertiliser; mechanisation of transplanting and harvesting; modern milling and branding of Basmati; and water pricing and canal improvements that reward saving water.

Part (ii): Fishing Industry in Pakistan

Branches and Fishing Grounds

The fishing industry of Pakistan has two branches. Marine fisheries operate along the roughly 1,046 kilometre coastline of Sindh and Balochistan on the Arabian Sea, whose continental shelf is rich in fish and shrimp because the Indus delta and coastal creeks provide breeding and feeding grounds. The main fishing centres and harbours are Karachi (the largest, with the Karachi Fish Harbour and Korangi harbour), Ibrahim Hyderi, and along the Balochistan coast Gwadar, Pasni, Ormara, Sonmiani and Jiwani. The catch includes high-value shrimp and prawns, pomfret, mackerel, ribbon fish, croaker, sardines and many other species, part of which is

exported fresh, frozen or processed, while the rest supplies the domestic market and fishmeal plants. Inland fisheries operate in the Indus and its tributaries, in natural lakes such as Manchar, Keenjhar and Haleji in Sindh and the lakes of Punjab, in great reservoirs — Tarbela, Mangla and Chashma — and increasingly in fish farms (aquaculture), where carp species such as rohu, mrigal, grass carp and silver carp are raised in ponds, especially in Punjab and Sindh. Inland fish is consumed almost entirely within the country and is important for the nutrition and income of rural communities.

Importance of the Industry

Fisheries contribute modestly to GDP but greatly to livelihoods and nutrition. Several hundred thousand families — fishermen, boat builders, net makers, processors, ice makers, traders and transporters — depend directly or indirectly on the catch, many of them in poor coastal communities of Sindh and Balochistan for whom fishing is the only occupation. Fish is a cheap and healthy source of protein, iron and essential oils in a country with widespread under-nutrition. Exports of fish and shrimp earn valuable foreign exchange — several hundred million dollars a year — going mainly to China, Thailand, the Gulf states, South-East Asia and the European Union when quality standards are met. The industry also supports fishmeal, fish oil and processing plants and the boat-building yards of Karachi and Gwadar.

Problems of the Fishing Industry

The industry is held back by serious problems. Overfishing, the use of fine-mesh and destructive nets, and fishing during breeding seasons have reduced stocks, so that boats must go farther and catch smaller fish. Most fishing boats are small, wooden and non-mechanised or poorly

equipped, without ice, refrigeration or navigation aids, so a part of the catch spoils before reaching market. Harbours and landing centres lack clean water, cold storage and hygienic handling, which has repeatedly caused export bans and rejections, notably by the European Union in the past. Pollution from Karachi's industrial and sewage waste damages the creeks and mangroves where fish breed, and the decline of Indus flow below Kotri has shrunk the delta's fisheries. Fishermen are poor, often indebted to middlemen, and lack credit, insurance and modern training. Inland fisheries suffer from water scarcity, pollution, and competition for lake and river water.

Suggestions and Prospects

Improvement requires action on several fronts: enforcement of net-size rules, closed seasons and licensing to protect breeding stocks; credit and subsidies for mechanised boats, ice plants and cold chains; upgrading Karachi Fish Harbour and developing Gwadar and other harbours to international sanitary standards so that high-value markets stay open; protecting and replanting mangroves and ensuring minimum river flows to the delta; organising fishermen into cooperatives to free them from middlemen; and expanding aquaculture — pond farming, cage culture in reservoirs and shrimp farming — which worldwide now supplies about half of all fish consumed and offers Pakistan its greatest room for growth. With CPEC investment at Gwadar and rising world demand for seafood, a modernised fishing industry can earn far more foreign exchange and provide far better livelihoods than it does today.

Conclusion

To conclude, rice and fisheries are two water-based pillars of Pakistan's economy. Rice, grown mainly in the Basmati tract of north-east Punjab and the canal-irrigated districts of Sindh and Naseerabad, is both a staple food and one of the country's leading exports, limited chiefly by water scarcity, moderate yields and competition in world markets. The fishing industry, divided between marine fisheries of the Sindh and Balochistan coast and inland fisheries of rivers, lakes, reservoirs and fish farms, provides food, employment and export earnings, but suffers from overfishing, poor boats and harbour hygiene, pollution and shrinking delta flows. Better water management in the rice fields and better boats, harbours, stock protection and aquaculture in fisheries would raise the contribution of both to Pakistan's food security and foreign exchange.

Question 3: Causes of Electricity Shortage in Pakistan and Government Measures (20 Marks)

What are the causes of electricity shortage in Pakistan? Explain government measures to cope with this problem.

Introduction

Electricity is the invisible foundation of modern economic life: factories, tube wells, hospitals, schools, offices and homes all stop when it fails. Pakistan has suffered from a chronic electricity shortage — commonly called load-shedding — for much of the past three decades, in which demand for power exceeds supply, especially in the heat of summer, and consumers face scheduled and unscheduled cuts of several hours a day. The shortage has cost the economy

dearly in lost production, closed factories, damaged crops and public frustration. Yet Pakistan is not a country without energy resources: it has great rivers for hydel power, some of the world's largest coal deposits at Thar, bright sunshine, wind corridors, and natural gas. The shortage is therefore as much a problem of finance, planning and management as of resources. This answer explains the main causes of the electricity shortage and then describes the measures the government has taken, and is taking, to cope with the problem.

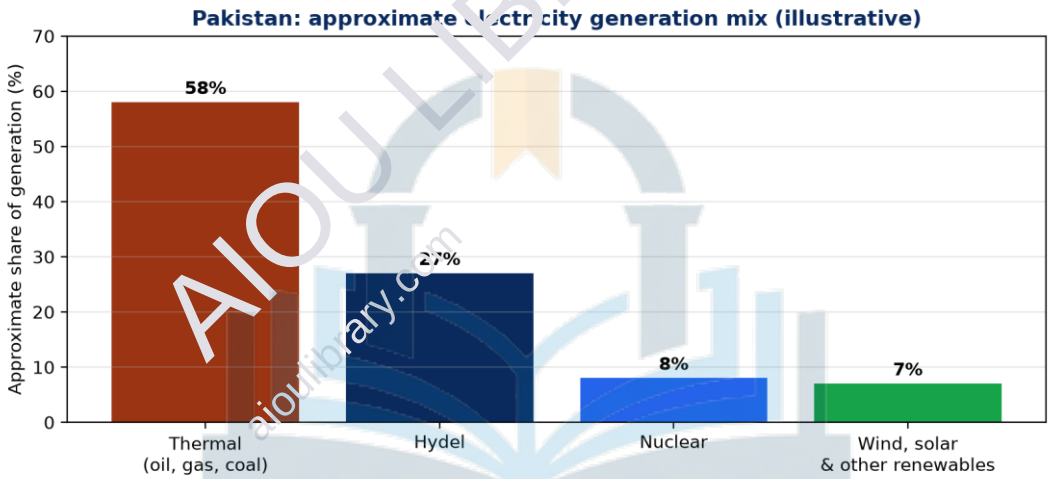

Figure 1: Approximate electricity generation mix of Pakistan (illustrative shares). Thermal sources dominate, which is a root cause of high cost and shortage.

Causes of Electricity Shortage in Pakistan

1. Demand Growing Faster than Supply

The most basic cause is a widening gap between demand and installed, dependable supply. Pakistan's population has grown rapidly, cities have expanded, and millions of new connections, fans, air conditioners, tube wells, mobile chargers and industries have been added, so summer peak demand has repeatedly outrun generation. For long periods, especially in the 1990s and

again after the mid-2000s, too few new power stations were built to keep pace, because of financial constraints, political instability and long construction periods for dams. Even where nameplate capacity exists, dependable capacity is lower because of old plants, breakdowns, fuel shortages and reduced river flows in winter, so the effective shortage is larger than official figures suggest.

2. A Costly and Import-Dependent Generation Mix

Pakistan generates the larger part of its electricity from thermal sources — natural gas and imported furnace oil and liquefied natural gas (LNG) — while its cheapest source, hydel power from its great rivers, supplies only roughly a quarter to a third, varying with the season. Furnace oil generation is extremely expensive, and imported fuels expose the power sector to world prices and to the exchange rate: when oil prices rise or the rupee falls, generation costs soar, the government cannot recover them fully from consumers, and power producers cannot be paid on time. Gas, once cheap and abundant, has declined as domestic fields deplete, forcing expensive LNG imports. In short, the generation mix itself manufactures financial shortage, which then becomes physical shortage when fuel cannot be bought.

3. Circular Debt

The famous circular debt is the financial heart of the crisis. Distribution companies fail to collect the full cost of the electricity they sell, because of theft, non-payment and government-set tariffs below cost; they therefore cannot pay the transmission and generation companies; generators cannot pay fuel suppliers; and fuel suppliers cut supplies, so plants shut down and load-shedding increases even where physical capacity exists. Subsidies promised by the

government are often paid late, adding to the chain of arrears. Circular debt has repeatedly accumulated to well over a trillion rupees, and clearing it without reforms has only allowed it to build up again.

4. Transmission and Distribution Losses and Theft

Pakistan loses a large share of its electricity — commonly around a sixth to a fifth of what is generated, and much more in the worst distribution companies — between the power station and the consumer's meter. Part of this is technical loss in old, overloaded lines and transformers; a large part is outright theft through illegal connections (kundas), meter tampering and collusion, concentrated in certain high-loss areas. Every unit stolen or lost is a unit paid for by honest consumers or by the state, raising tariffs, deepening circular debt and discouraging investment. Weak distribution companies, especially in some regions, have proved unable or unwilling to enforce payment.

5. Seasonal and Water Problems of Hydel Power

Hydel generation falls sharply in winter, when river flows decline and canals close for maintenance, exactly when fog and cold increase some demands and when thermal plants may lack gas, which is diverted to domestic heating. Storage capacity is limited: Pakistan stores only a small fraction of its annual river flow, and the existing reservoirs of Tarbela and Mangla have lost capacity to sedimentation. Delays of decades in building new large dams — for political, financial and inter-provincial reasons — have kept the cheapest and cleanest source from growing as it should.

6. Governance, Pricing and Planning Failures

Behind the physical causes lie institutional ones: politically influenced appointments and interference in power companies; tariffs announced late or held down for popularity, creating losses that return as circular debt; poor demand forecasting and project selection (for example, plants built far from load centres or fuel); delays in land, approvals and financing; and neglect of energy conservation — inefficient fans, motors, tube wells and buildings waste a large part of the electricity that is generated. Corruption and weak accountability in procurement and billing complete the picture.

Table 1: Main causes of electricity shortage in Pakistan

Cause	How It Produces Shortage
Demand outgrowing supply	Peak demand exceeds dependable generation, especially in summer
Costly thermal-heavy mix	Imported oil/LNG raise costs; fuel cannot be bought when payments fail
Circular debt	Non-payment chain shuts down generators despite installed capacity
T&D losses and theft	A large share of power never reaches paying consumers
Seasonal hydel decline	Winter low flows reduce cheapest generation; storage is limited
Governance and pricing failures	Below-cost tariffs, late decisions, inefficiency and waste

Government Measures to Cope with the Problem

1. Adding Generation Capacity

Successive governments have added capacity on a large scale. Under the China–Pakistan Economic Corridor (CPEC), several thousand megawatts of coal, hydel and other projects were built in a short period in the mid-2010s — including Sahiwal, Port Qasim and Hub coal plants and Thar coal mine-mouth stations — which greatly reduced the worst load-shedding of earlier years. Thar coal development is strategically important because it replaces imported fuel with a domestic resource. Large hydel projects have been advanced: Diamer-Bhasha Dam (4,500 MW, also vital for water storage), Dasu (4,320 MW in stages) and Mohmand Dam are under construction, Mangla was raised and its refurbishment is increasing output, and smaller projects such as Neelum-Jhelum (969 MW) and Karot (720 MW, CPEC) have been completed. Nuclear capacity has been expanded with the Karachi K-2 and K-3 units (about 1,100 MW each), providing low-cost, fuel-secure base-load power.

2. Diversifying towards Cheap and Renewable Energy

Government policy now targets a much larger share of indigenous and renewable energy: solar parks such as Quaid-e-Azam Solar at Bahawalpur, the wind corridor at Jhimpir in Sindh, bagasse and small hydel plants, and a rapid growth of rooftop solar through net metering, under which consumers install panels, use what they need and sell the surplus to the grid. Hundreds of thousands of consumers have adopted rooftop and tube-well solarisation, supported by government schemes to solarise agricultural tube wells and public buildings. The Indicative

Generation Capacity Expansion Plan (IGCEP) formally plans future additions on a least-cost basis, favouring hydel, nuclear, Thar coal and renewables over imported-fuel plants.

3. Financial and Institutional Reforms

To attack circular debt, governments have repeatedly cleared accumulated debt, raised tariffs towards cost recovery (while protecting small consumers through lifeline rates), reduced subsidies to those who can pay, and introduced surcharges and fuel-cost adjustments so bills reflect actual generation costs. The power sector's structure has been reorganised over time — WAPDA was unbundled into generation, transmission (NTDC) and distribution companies, with NEPRA as regulator — and recent policy moves towards a competitive wholesale market (CTBCM), privatisation or concessioning of distribution companies, and installation of smart and aerial-bundled cables in high-theft areas to cut losses. Anti-theft campaigns, disconnection drives and technology such as transformer monitoring are used against electricity theft, which has been declared a punishable offence with special enforcement operations.

4. Transmission Improvement and Conservation

New high-voltage transmission lines, including the Matiari–Lahore HVDC line built under CPEC, have been added to carry power from southern plants and Thar to the load centres of Punjab, and grid stations are being upgraded to reduce bottlenecks and technical losses. On the demand side, the government promotes energy conservation: distribution of energy-saving fans and LED lights, standards and labelling for appliances, replacement of inefficient agricultural tube wells, building energy codes, and public campaigns to switch off unnecessary

loads. Even a modest percentage saved is equivalent to a medium power station that never has to be built or fuelled.

5. Remaining Challenges

These measures have changed the problem rather than ended it. Where once the binding constraint was too few power stations, today it is increasingly the cost of capacity payments, transmission limits at peak hours, high losses in some distribution companies and the affordability of electricity for industry and households. Load-shedding is now often imposed deliberately in high-loss areas as 'load management' rather than from a national generation deficit. The lesson of experience is that durable relief requires continuing the reforms — loss reduction, cost-reflective but fair tariffs, least-cost planning and a shift to indigenous energy — rather than one-time debt clearances or emergency rental plants, which Pakistan tried in the past at great expense.

Conclusion

In conclusion, Pakistan's electricity shortage arises from demand outgrowing dependable supply, an expensive and import-dependent generation mix, circular debt, heavy transmission and distribution losses and theft, seasonal decline of hydel power, and long-standing governance and pricing failures. The government's response has combined large additions of capacity — CPEC thermal and Thar coal plants, new nuclear units and major dams under construction — with diversification into solar, wind and net metering, financial reforms against circular debt, anti-theft and loss-reduction drives, transmission upgrades and conservation programmes. These steps greatly reduced the severe shortages of the early 2010s, but lasting

freedom from load-shedding will come only when power is generated cheaply from indigenous sources, delivered with low losses, and paid for honestly by all consumers.

Question 4: Means of Communication and the Challenges of Oral, Written and Non-Verbal Communication (20 Marks)

Define the means of Communication. What are unique challenges to oral, written and non-verbal communication?

Introduction

No business, office or society can work for a single day without communication. Orders are given, goods are sold, prices are negotiated, complaints are answered and plans are made — all through the exchange of messages. Yet communication is also one of the most failure-prone of human activities: letters are misunderstood, speeches are misheard, and a gesture that is friendly in one culture is offensive in another. Commercial geography and business studies therefore treat communication as an organised system with definite means, and study the special difficulties of each form of communication so that they can be overcome. This answer first defines communication and its means, describes the principal means of communication, and then explains the unique challenges of oral, written and non-verbal communication.

Definition of Communication and Its Means

Communication may be defined as the process of exchanging information, ideas, facts, feelings and instructions between two or more persons in such a way that the receiver understands the

message in the same sense as the sender intended. It is a two-way process with several elements: a sender who encodes a message, a channel or medium through which the message travels, a receiver who decodes it, and feedback by which the sender learns whether the message was understood. If any element fails — a badly worded message, a noisy channel, an inattentive receiver, no feedback — communication fails, even though words were spoken or written.

The means of communication are the channels, media and devices through which messages are transmitted from sender to receiver. They range from the oldest means — face-to-face speech, messengers and letters carried by post — to the modern electronic means: the telephone and mobile phone, e-mail, messaging applications, video conferencing, websites and social media, as well as mass media such as newspapers, radio and television. In commerce, means such as letters, quotations, invoices, telephone calls, e-mails and meetings carry the entire flow of business information between firms, customers, banks, transporters and government offices. Means of communication are conventionally grouped by the form of the message they carry into three great types: oral (spoken) communication, written communication, and non-verbal communication, which always accompanies the other two. Each type has its own advantages — and its own unique challenges.

Table 1: The three forms of communication compared

Type	Examples	Chief Strength	Chief Weakness
Oral	Meetings, telephone, video calls, speeches, interviews	Fast, personal, immediate feedback	No permanent record; easily misunderstood or forgotten
Written	Letters, e-mails, reports,	Permanent record;	Slow feedback; tone can be misread; needs

	contracts, notices	careful wording possible	literacy and drafting skill
Non-verbal	Gestures, facial expressions, posture, dress, silence, punctuality	Reinforces or reveals true feelings; crosses language partly	Ambiguous; differs greatly between cultures

Unique Challenges of Oral Communication

Oral communication — speaking and listening in conversation, meetings, interviews, telephone calls and presentations — is the most used and most natural form, but it faces distinctive challenges. First, it leaves no permanent record: what was said can be forgotten, denied or differently remembered by each party, which is dangerous for prices, promises and instructions. Second, it is highly vulnerable to noise and barriers at the moment of speaking — actual noise, a poor phone line, different accents and dialects, and the use of technical jargon or a language in which the listener is not fluent. In Pakistan, where business may be conducted in Urdu, English and regional languages in the same day, language difference is a daily oral challenge.

Third, oral messages are filtered by emotion and perception: an angry or tired listener hears criticism where none was intended, and a nervous speaker may say the opposite of what he means. Fourth, oral communication suffers from poor listening — most people listen to reply rather than to understand — and from the chain effect in organisations, where a message passed verbally through several persons is progressively distorted, like the message in the children's game of Chinese whispers. Fifth, oral communication offers no time for revision: a careless word in a meeting or negotiation cannot be unsaid, whereas a letter can be redrafted. Finally, in large or virtual meetings, lack of attention, multitasking and the absence of visible

reaction reduce understanding further. The remedies are preparation, speaking clearly and briefly, choosing the right language and level, checking understanding by feedback and summaries, and confirming important oral agreements in writing.

Unique Challenges of Written Communication

Written communication — letters, e-mails, reports, memos, contracts, advertisements and notices — is the backbone of business records, but its challenges are equally unique. First, it is one-way at the moment of reading: the writer is absent, so the reader cannot ask an immediate question, and any ambiguity, error or missing detail may cause a wrong action before clarification arrives. Second, written communication demands skill: a person who speaks well may write poorly, and errors of grammar, spelling, organisation or tone can damage the image of a firm and even change legal meaning. Third, the written word has no tone of voice or facial expression, so a short message intended as efficient may be read as rude, and irony or humour is easily misread, especially across cultures and in e-mail and chat.

Fourth, written messages can be delayed, lost, buried in an overloaded inbox or read long after their moment has passed — a problem of timing that oral communication rarely faces. Fifth, written records are permanent and forwardable: an ill-judged e-mail can be copied, leaked or produced in court years later, so confidentiality and caution are constant concerns; conversely, the same permanence makes writing legally valuable. Sixth, written communication presumes literacy and access: in a country where a significant part of the population, especially in rural areas, has limited literacy, written notices and forms can exclude the very people they are meant to serve, and digital writing further presumes devices, connectivity and digital skills. The

remedies are plain language, careful drafting and proofreading, clear structure with headings and summaries, choosing the right medium for the urgency of the message, and confirming receipt of critical documents.

Unique Challenges of Non-Verbal Communication

Non-verbal communication is the transmission of messages without words: through facial expressions, eye contact, gestures, posture, personal appearance and dress, distance and touch, time-keeping, silence and tone of voice (paralanguage). Research in business communication commonly observes that a large part of the impression created in face-to-face dealings comes from these signals rather than from the words themselves. Its unique challenges follow from its nature. First, non-verbal signals are ambiguous: crossed arms may mean defensiveness, cold or simple habit; a smile may express pleasure, politeness or embarrassment. Unlike words, signals cannot be checked in a dictionary, so misinterpretation is frequent.

Second, non-verbal communication varies greatly between cultures. Direct eye contact is a sign of honesty in some societies and of disrespect in others; the thumbs-up gesture, the use of the left hand, personal distance, handshakes between men and women, and the meaning of silence all differ between Pakistan, the Arab world, Europe and East Asia. In international trade and in Pakistan's own multicultural society, an innocent gesture can offend a customer or partner. Third, non-verbal signals are mostly involuntary and continuous: a person can stop speaking but cannot stop communicating — his lateness, dress, expression and fidgeting keep sending messages, sometimes contradicting his words. When words and body language conflict,

listeners usually believe the body language, which is why a manager who praises staff while looking at his phone destroys his own message. Fourth, non-verbal communication leaves no record and cannot easily be quoted or verified, and in digital communication it is largely absent — which is why video calls feel poorer than meetings and why emojis have been invented as a substitute. The remedies are cultural awareness, observing clusters of signals rather than single gestures, keeping words and body language consistent, and choosing face-to-face or video channels when the human element matters.

Conclusion

In conclusion, communication is the process of exchanging messages so that the receiver understands them as the sender intended, and its means are the channels — spoken, written and non-verbal, carried today increasingly by electronic media — through which those messages travel. Each form has unique challenges: oral communication is fast and personal but unrecorded, easily distorted, and at the mercy of language, noise and listening; written communication is permanent and precise but slow to clarify, dependent on writing skill and literacy, and deprived of tone; and non-verbal communication is powerful and constant but ambiguous and deeply cultural, capable of silently contradicting the spoken word. The effective communicator — and the successful business — chooses the right means for each message, combines forms (speaking, then confirming in writing), seeks feedback, and respects the cultural setting in which communication takes place.

Question 5: Means of Transportation of Pakistan — A Detailed Note (20 Marks)

Write detailed note on the means of transportation of Pakistan.

Introduction

Transport is the circulatory system of a country's economy. It carries wheat from the farm to the mill, cotton from the gin to the port, workers to factories, pilgrims to shrines and tourists to mountains; without it, production remains local, markets stay small and prices rise. Pakistan, stretched about 1,600 kilometres from the Arabian Sea to the Himalayas, depends on a transport network that must cross deserts, rivers, plains and some of the highest mountains on earth. Historically the Indus river was the great highway; the British built the railway and road skeleton of the plains; and since independence roads have taken the leading role, joined by ports, pipelines and air services, and now transformed in places by motorways and CPEC corridors. This note describes in detail the means of transportation of Pakistan — road, rail, air, water and pipeline transport — together with their importance, problems and recent development.

Road Transport

Road transport is the backbone of Pakistan's transport system, carrying the great majority of passenger traffic and roughly nine-tenths of freight traffic. The total road network is on the order of 264,000 kilometres, ranging from village tracks and provincial roads to national highways and motorways administered by the National Highway Authority (NHA). The historic

Grand Trunk (GT) Road from Karachi through Hyderabad, Multan, Lahore and Rawalpindi to Peshawar remains the country's busiest artery, paralleled and relieved by the motorway network: the M-1 (Peshawar–Islamabad), M-2 (Islamabad–Lahore), M-3, M-4 and M-5 (Multan–Sukkur), M-6 and M-9 links towards Karachi, which have cut journey times and accidents between the major cities. The Karakoram Highway, climbing through the mountains to the Khunjerab Pass and China, is both a strategic and a trade route and an engineering marvel.

Road vehicles in Pakistan include buses and coaches, minibuses and wagons in the cities, rickshaws and motorcycle rickshaws, taxis and ride-hailing cars, and a vast fleet of trucks, tankers and trailers that move almost all goods, because trucks offer door-to-door service, flexible timing and access to every village — advantages the railway cannot match. Road transport's weaknesses are equally well known: congestion and poor maintenance on many highways, overloaded trucks that damage road surfaces, high accident rates, old vehicles and rising fuel costs. Government responses include motorway expansion, highway dualisation, weigh stations against overloading, bus rapid transit systems in Karachi, Lahore, Islamabad, Peshawar and Multan, and road upgrading under CPEC, such as the rebuilt Karachi–Peshawar corridor sections and western route roads in Balochistan and Khyber Pakhtunkhwa.

Rail Transport

Pakistan Railways, inherited largely from the British era, operates a network of roughly 7,800 kilometres of track, mainly broad gauge, with its headquarters in Lahore. The main line (ML-1) runs from Karachi to Peshawar through Hyderabad, Rohri, Multan, Lahore and Rawalpindi, with branch lines serving most large towns of the Indus plain; famous trains such as the Green Line,

Karakoram Express, Karachi Express and Khyber Mail carry long-distance passengers, while freight trains haul containers from Karachi port, coal to power plants, oil, fertiliser and containers to the dry ports of Lahore, Faisalabad, Sialkot and other cities.

Rail is naturally the cheapest and most energy-efficient means for bulk goods over long distances, and the safest for passengers, yet its share of traffic has declined for decades because of under-investment: track, bridges, signalling and locomotives aged, speeds fell, accidents and delays damaged its reputation, and freight was lost to trucks. Revival efforts include procurement of new locomotives and coaches from China, rehabilitation of track, and above all the planned ML-1 upgrade under CPEC — rebuilding the Karachi–Peshawar line for higher speeds and capacity — which is regarded as the single most important transport project in the country. Successful revival would cut freight costs between Karachi and the north, reduce road damage and emissions, and restore the railway as a true national carrier.

Air Transport

Air transport is the fastest and most expensive means, used for passengers, mail, perishables and high-value goods, and as a lifeline for remote areas. Pakistan International Airlines (PIA), the national carrier, together with private airlines such as Airblue, Serene Air and AirSial, operates domestic and international services. Major international airports include Jinnah International (Karachi), Allama Iqbal International (Lahore), Islamabad International Airport (opened 2018), and airports at Peshawar, Quetta, Multan, Faisalabad, Sialkot and Gwadar, with many smaller airports serving northern and remote districts where air links substitute for

difficult roads — Gilgit, Skardu, Chitral and Turbat among them. Skardu's direct flights have notably boosted mountain tourism.

Air transport's economic importance exceeds its small share of traffic: it carries millions of overseas Pakistanis whose remittances support the economy, connects exporters of fruit, vegetables, meat and garments to Gulf and European markets within hours, and brings tourists and business travellers. Its problems include the financial difficulties of PIA, high fuel and airport costs, and limited cargo facilities. The new Gwadar International Airport, built with Chinese support and among the largest in Pakistan by area, is intended to serve CPEC and the Makran coast, while privatisation and restructuring of the national airline are under active government consideration.

Water Transport

Pakistan's water transport is almost entirely sea transport, since the Indus, once navigated, is now little used for inland shipping because of barrages, seasonal flows and competition from road and rail. Sea transport, however, is the lifeline of foreign trade: the overwhelming bulk of Pakistan's imports and exports by weight — petroleum, coal, containers, fertiliser, steel and bulk cargo — passes through its ports. Karachi Port, the oldest and busiest, and Port Muhammad Bin Qasim nearby, together handle the great majority of the nation's cargo and are connected by rail and road to the whole country; container terminals operated with international partners have modernised handling at both.

Gwadar Port in Balochistan, developed with China under CPEC, is the strategic addition: a deep-water port near the mouth of the Gulf, intended to serve trade with China, Central Asia and the

Gulf, to develop Balochistan's fisheries and industry, and to provide an alternative outlet for Pakistan's trade. Coastal shipping between Pakistani ports and fishing harbours — Karachi, Ibrahim Hyderi, Gwadar, Pasni, Ormara and Jiwani — supports the fishing industry described elsewhere in these assignments. Water transport is the cheapest per tonne-kilometre for bulk cargo and the only practical means for intercontinental trade; its challenges are port congestion and draft limits at Karachi, the need for dredging and modern equipment, and the still-developing road and rail links behind Gwadar.

Pipeline Transport

Pipelines are a specialised but vital means of transport for liquids and gases. Pakistan has an extensive natural gas pipeline network operated by Sui Northern and Sui Southern Gas companies, carrying gas from Sui, Qadirpur and other fields to cities and industries across the country; oil pipelines carry crude oil from Karachi to the refinery at Multan (Pak-Arab Refinery pipeline) and refined products from Karachi and Multan towards the north (through the White Oil Pipeline and related systems), reducing the load on road tankers. Pipelines are safe, cheap and continuous once built, though costly to construct and fixed in route; proposed international pipelines, such as gas pipelines from Iran and Turkmenistan (TAPI), remain under discussion and would, if built, change Pakistan's energy transport map.

Table 1: Means of transportation of Pakistan compared

Means	Main Network / Examples	Share & Role	Main Problems
Road	GT Road, motorways M-1 to M-9, Karakoram Highway	Carries most passengers and about 90% of freight	Congestion, overloading, accidents, maintenance

Rail	Pakistan Railways, ML-1 Karachi–Peshawar	Cheapest for bulk long-distance; dry-port containers	Ageing track and stock, low speeds, under-investment
Air	PIA & private airlines; Karachi, Lahore, Islamabad, Gwadar airports	Fastest; passengers, perishables, overseas Pakistanis	High cost, airline finances, limited cargo facilities
Water (sea)	Karachi Port, Port Qasim, Gwadar	Handles bulk of foreign trade by weight	Congestion, draft limits, Gwadar links developing
Pipeline	Sui gas networks, Karachi–Multan oil pipelines	Continuous, cheap transport of oil and gas	Fixed routes, high construction cost

Importance, Problems and Prospects

Taken together, these means of transport determine Pakistan's economic geography: they explain the growth of Karachi as port and metropolis, the industrial corridor of the GT Road and motorway belt, the dry ports that bring the sea to inland exporters such as Sialkot, and the isolation of areas — much of Balochistan, interior Sindh and the mountain north — where transport remains poor. Common problems across the system are under-investment in maintenance, energy costs, institutional weaknesses and the imbalance between modes, in which roads carry traffic that rail and water could carry more cheaply. The prospects lie in completing the ML-1 railway upgrade, extending motorways and the CPEC western route, developing Gwadar and its links, modernising urban public transport, and integrating the modes into true logistics corridors, so that a container can move from a factory in Sialkot or Faisalabad to a ship at Karachi or Gwadar quickly, cheaply and reliably.

Conclusion

In conclusion, the means of transportation of Pakistan comprise road transport — the dominant mode, based on the GT Road, national highways, motorways and the Karakoram Highway; rail transport through Pakistan Railways and the Karachi–Peshawar main line; air transport through PIA, private airlines and a network of international and regional airports; water transport through the sea ports of Karachi, Port Qasim and Gwadar; and pipeline transport for oil and natural gas. Each mode has its own field: roads for flexibility, rail for bulk over land, air for speed, sea for world trade and pipelines for energy. Pakistan's development — cheaper trade, stronger industry, united markets and rising exports — depends on strengthening all of them together, with the CPEC programme and the ML-1 project offering the best opportunity in a generation to do so.

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