3 Water Resources

CHAPTER

Level - 1 CORE SUBJECTIVE QUESTIONS

MULTIPLE CHOICE QUESTIONS (MCQs)

1. Option (D) is correct

   Explanation: Meghalaya, a state in north-eastern India, is known for its traditional bamboo drip irrigation system. This ancient method is widely used by farmers, particularly in hilly areas, to efficiently channel water from natural springs to agricultural fields. The system relies on bamboo pipes to transport water over long distances, ensuring minimal wastage and sustainable irrigation.

2. Option (C) is correct

   Explanation: The bamboo drip irrigation system is a traditional and eco-friendly method of irrigation primarily practicsed in Meghalaya, especially in its hilly regions. This system uses bamboo pipes to transport and distribute water from natural springs to agricultural fields. It is known for its efficiency in conserving water and is mainly used for irrigating betel leaf, black pepper, and areca nut plantations.

3. Option (C) is correct

   Explanation: Tankas are underground rainwater storage tanks, traditionally used in the Thar Desert region of Rajasthan, particularly in areas like Jaisalmer and Bikaner. These structures help conserve rainwater for household use, drinking, and irrigation in regions with low rainfall and scarce water sources.

4. Option (D) is correct

   Explanation: The Tungabhadra Dam is located in the Ballari district of Karnataka. It is built across the Tungabhadra River, which is a tributary of the Krishna River. It is a multi-purpose dam used for irrigation, hydro electric power generation, flood control, and drinking water supply.

5. Option (B) is correct

   Explanation: The Bhakra-Nangal Project is one of the largest multi-purpose river valley projects in India. It is built on the Sutlej River in Himachal Pradesh and Punjab.

   The Bhakra Dam has several hydro electric power plants that generate electricity, supplying power to Punjab, Haryana, Rajasthan, and Himachal Pradesh.

   Irrigation (ii)– The dam provides irrigation water to vast agricultural lands in Punjab, Haryana, and Rajasthan, making it crucial for India's Green Revolution.

   Transportation (iii)– The dam is not used for navigation or transportation.

   Cleaning (iv)– While water may be used in some cleaning processes, this is not a primary purpose of the project.

6. Option (C) is correct

   Explanation: The phrase "dams are the modern temples of India" was famously proclaimed by Jawaharlal Nehru, India's first Prime Minister. He emphasised the crucial role of dams in the economic development of the country.

   The dams support irrigation by providing water for agriculture, boosting food production and rural livelihoods. The dams provide hydroelectric power thereby helping in industrial and urban development.They help regulate water flow and prevent floods, ensuring stability in agricultural and urban areas.

7. Option (A) is correct

   Explanation: In recent years, large dams have been criticised for several social, economic, and environmental reasons. One major issue is the unequal distribution of water and benefits, leading to social and economic disparities:

   Unequal access to water– Wealthy farmers with large landholdings get better access to irrigation, while small and marginal farmers often struggle.

   Change in cropping patterns – With assured irrigation, farmers shift to water-intensive crops (e.g., sugarcane, rice), leading to overuse of water and soil degradation.

   Displacement of Communities– Large dam projects often submerge villages, displacing

thousands of people, particularly tribal and rural populations.

Environmental Concerns– Dams disrupt river ecosystems, fish migration, and biodiversity, affecting local livelihoods.

8. Option (C) is correct.

Explanation: In the Western Himalayas, Guls (or Kuls) are traditional diversion channels used to carry water from glaciers and streams to fields for irrigation.

MATCH THE FOLLOWING QUESTIONS

1. Option (D) is correct.

Explanation: Sardar Sarovar dam is built on Narmada river in Gujarat.

Hirakud Dam is the longest earthen dam in the world, built across the Mahanadi River in Odisha.

Bhakra Nangal Dam is a concrete gravity dam on the Satluj River in Bhakra Village in Bilaspur district, Himachal Pradesh.

Nagarjunasagar dam is a masonry dam across the Krishna River on the border of Andhra Pradesh and Telangana.

2. Option (C) is correct

Explanation: Hirakud dam is built across Mahanadi river in Odisha.

Sardar Sarovar dam is built on Narmada river in Gujarat.

Rana Pratap Sagar dam is built across Chambal river in Rajasthan.

Salal dam is built across Chenab river in Jammu and Kashmir.

3. Option (A) is correct

Explanation: Rainwater is the purest form of water, underground water are used via hand pumps, sea water is saline water containing large amounts of salt and flood leads to soil erosion.

4. Option (A) is correct

Explanation: Khadins and johad are storage structures for rainwater in Jaisalmer and parts of Rajasthan, respectively, Tankas are found in parts of Rajasthan especially in Bikaner; Barmer, Phalodi, Guls and Kuls are diversion channels found in western Himalayas.

ASSERTION-REASON QUESTIONS

1. Option (C) is correct

Explanation: Assertion is true as growing population leads to water scarcity. Reason is false as dams provide the means for water storage to overcome the problem of water scarcity.

2. Option (C) is correct

Explanation: Water is utilised on a large basis because the increasing population requires more water for cooking, washing, etc. So, solely irrigation is not responsible for water scarcity.

3. Option (A) is correct

Explanation: Water is considered a renewable resource because it is replenished through the natural water cycle, which includes precipitation, evaporation, and condensation.

Freshwater is mainly obtained from surface runoff and groundwater that is continually being renewed. Freshwater sources such as rivers, lakes, and groundwater are replenished through precipitation and the movement of water within the hydrological cycle. Reason (R) correctly explains why Assertion (A) is true.

4. Option (A) is correct

Explanation: Dams serve multiple functions beyond just storing water. They contribute to irrigation, hydro-electric power generation, flood control, and more.

Dams are built for irrigation, electricity generation, water supply, water supply for domestic and industrial use, flood control, recreation, and fish breeding. Dams provide water for agriculture, generate electricity, supply drinking and industrial water, help in flood management, and support activities like fishing and tourism. Reason correctly explains why Assertion is true.

VERY SHORT ANSWER TYPE QUESTIONS

1. (i) The water in the stepwells can be accessed easily by descending down the steps.

(ii) Stepwells are communal in nature where anyone can use the water.

2. Sophisticated hydraulic structures like dams built of stone rubble, reservoirs or lakes, embankments and canals for irrigation were built in various regions of the country.

(1) A sophisticated water harvesting system channelling the flood water of river Ganga was built at Sringaverpura near Allahabad in the 1st century B.C.

(2) Nagarjunakonda in Andhra Pradesh, Bennur in Karnataka, Kolhapur in Maharashtra and Kalinga in Odisha have evidences of irrigation structures.

(3) In the 11th century, Bhopal lake, one of the largest artificial lakes of its time was built.

(4) The tank in Hauz Khas, Delhi was constructed by Alauddin Khilji in the 14th century to supply water to the Siri Fort area.

(Any two)

3. Groundwater is a highly overused resource because:
   (i) Due to large and growing population and consequent greater demands for water and unequal access to it.
   (ii) To facilitate higher food grain production for large population, water resources are being over exploited to expand irrigated areas and dry season agriculture.
   (iii) In the housing societies or colonies in the cities, there is an arrangement of own ground water pumping devices to meet water demands.
4. The social consequences of multi-purpose projects are:
   (i) It led to heavy displacement of people which deprived the people of their land and livelihood.
   (ii) It has increased the economic gap between the rich landowners and the landless poor.
5. Dams are called multi-purpose projects because they serve multiple functions, such as:
   (i) **Irrigation and Water Supply:** Dams store water for agricultural irrigation and provide drinking and industrial water.
   (ii) **Hydroelectric Power Generation:** They produce electricity by using water to turn turbines.
   (iii) **Flood Control:** Dams help regulate river flow, preventing floods in downstream areas.
   (iv) **Recreation and Fisheries:** They support activities like boating, tourism, and fish breeding. (Any two)
6. Traditional water harvesting systems help conserve and store water efficiently, ensuring water availability for agriculture and daily use, especially in water-scarce regions. These systems are cost-effective, eco-friendly, and rely on local knowledge.
   (i) **Khadins (Rajasthan):** Khadins are earthen embankments built across slopes to capture and store rainwater. The collected water seeps into the soil, making it available for crop cultivation.
   (ii) **Johads (Haryana & Rajasthan):** Johads are small, crescent-shaped ponds that collect rainwater. They recharge groundwater, improve soil moisture, and help in drought-prone areas. These systems promote sustainable water management and reduce dependence on large dams.

SHORT ANSWER TYPE QUESTIONS

1. **(i)** It represents the interconnectedness and inter-dependence between resources. Availability of food resources depends on water and a negative impact on agriculture would affect livelihoods impacting human resource.
   (ii) The situation represents lack of water management and over reliance on monsoons.
2. Post-independent India witnessed intensive industrialisation and urbanisation.
   (i) Apart from fresh water, MNCs also require electricity, which comes from hydroelectric power.
   (ii) Multiplying urban centres with large and dense populations and urban lifestyles have not only added to water and energy requirements, but have further aggravated the problem.
   (iii) Large-scale migration from rural to urban areas is causing over exploitation of water resources.
   (iv) Industrial wastes and effluents are discharged into rivers causing water pollution. (Any three)
3. (i) False, because there are evidences of dams found in ancient India as well.
   (ii) Name: Hirakud project in the Mahanadi Basin.
   Benefits: (1) Conservation of water; (2) Flood control.
4. (i) The advantages of rainwater harvesting are:
   (1) Provides water for drinking.
   (2) Provides irrigation water for inundation channels.
   (ii) The different ways in which rainwater harvesting is practised are:
   (1) People build diversion channels like kuls or guls of Western Himalayas.
   (2) People build tankas, underground tanks in Rajasthan.
5. Jawaharlal Nehru proclaimed dams as the "temples of modern India" because he saw them as symbols of progress, development, and self-sufficiency. He believed that large-scale infrastructure projects like dams would play a crucial role in building a strong and prosperous nation.
   (i) **Economic Development and Industrial Growth:** Dams support irrigation, hydroelectric power generation, and water supply, which are essential for agricultural and industrial development. They help increase crop production and provide electricity for industries, boosting economic progress.

(ii) **Flood Control and Water Conservation:** Dams regulate river flow, preventing floods that can destroy crops, property, and lives. They store water for use during dry periods, ensuring water availability for drinking and agriculture.

(iii) **Self-Reliance and Nation-Building:** Nehru saw dams as symbols of India's self-reliance and scientific advancement.They represented India's ability to use modern technology for development, reducing dependence on foreign resources.

Thus, Nehru considered dams as the foundation of a modern and strong India, just as temples were the foundation of ancient cultural and spiritual life.

6. Though water is sufficiently available to meet the needs of the people, but many areas still suffers from water scarcity. This can be substantiated through following arguments:

(i) Water scarcity may also be caused due to bad quality or polluted water despite its abundance.

(ii) There has been growing concerns that even when there is ample water available to meet the needs of the people, much of it may get polluted by domestic and industrial wastes, chemicals, pesticides and fertilisers used in agriculture, thus making it incapable for human use.

(iii) Fragile water resources get polluted due to release of various kinds of wastes in water bodies. Toxic gases and chemicals are released into it thereby causing scarcity of water resource.

7. Bamboo drip irrigation system is a 200 year old system of tapping stream and spring water by using bamboo pipe and transporting water from higher to lower regions through gravity.

The features of Bamboo drip irrigation are:

(i) 18-20 litres of water enters the bamboo pipe system, gets transported over hundreds of meters and finally reduces to 20-80 drops per minute at the site of the plant.

(ii) The flow of water into the pipes is controlled by manipulating the pipe positions.

LONG ANSWER TYPE QUESTIONS

1. (i) Damming affects the natural flow leading to poorer sediment flow and excessive sedimentation.

(ii) Fragmentation of rivers due to damming makes it difficult for migration of aquatic fauna.

(iii) The reservoirs that are created on the existing flood plains submerge and cause decomposition of existing vegetation.

(iv) Multi-purpose projects have led to the large-scale displacement of local communities. Example- Tehri Dam Andolan.

(v) Inter-state water disputes regarding the costs and benefits of these projects, are increasing. Example- Krishna-Godavari dispute between Andhra and Karnataka governments.

(vi) Conflicts between people wanting different uses and benefits from the same water resource are increasing. Example- Agitation by farmers in Sabarmati basin, Gujarat.

(Any five)

2. Water scarcity is due to the following reasons:

(i) 96.5 per cent of the total volume of world's water is estimated to exist as oceans and only 2.5 per cent as fresh water. Nearly 70 per cent of this fresh water occurs as ice sheets and glaciers, while a little less than 30 per cent as groundwater in the world's aquifers.

(ii) Water availability varies over space and time mainly due to the variation in seasonal and annual precipitation.

(iii) Rapid urbanisation.

(iv) Rapid increase in population that demand more and more water.

(v) Industrialisation is another cause; large industrial houses are using more and more water.

(vi) More water is required to generate electricity.

(Any five)

3. Rooftop water harvesting is important in Rajasthan because:

(i) It was commonly practised to store drinking water.

(ii) The rainwater can be stored in the tanks till the next rainfall, making it extremely reliable source of drinking water when all other sources are dried up, particularly in the summers.

(iii) Rainwater, or Palarpani, as commonly to as in these parts, is considered the purest form of natural water.

(iv) Many houses construct underground rooms adjoining the 'tanka' to beat the summer heat as it would keep the room cool.

(v) Some houses still maintain the tanks since they do not like the taste of tap water.

4. Keeping in view the disadvantages and rising resistance against the multi-purpose projects, water harvesting system is considered a viable alternative both socio-economically and environmentally.
   (i) In ancient India also along with the sophisticated hydraulic structures, there existed an extraordinary tradition of various water harvesting systems.
   (ii) People adopted different techniques in different areas. In hilly regions people built diversion channels like 'guls' and 'kuls' for agriculture.
   (iii) Rooftop rain water harvesting was commonly practised to store drinking water, particularly in Rajasthan.
   (iv) In the flood plains of Bengal, people developed inundation channels to irrigate their fields. Khadins, Johads and Tankas are the forms of rainwater harvesting practised in Rajasthan.

Level - 2 ADVANCED COMPETENCY FOCUSED QUESTIONS

MULTIPLE CHOICE QUESTIONS (MCQs)

1. Option (B) is correct
   Explanation: India receives a large amount of rainfall annually, but it is highly seasonal, with most rain falling during the monsoon months (June–September). The distribution is uneven across regions—some areas receive floods, while others remain dry. This leads to water scarcity during non-monsoon periods, especially in summer.
   Hence, the correct inference is that seasonal and uneven distribution is a major cause of water stress in India.
2. Option (C) is correct
   Explanation: The construction of large dams often leads to submergence of forests, affecting biodiversity and ecosystems, displacement of tribal and local communities, disrupting their lives and livelihoods, loss of traditional land and cultural identity. These criticisms do not deny the usefulness of dams, but highlight that development must be balanced with ecological and social responsibility.
3. Option (D) is correct
   Explanation: The success of rooftop rainwater harvesting in Rajasthan, a state with low rainfall and dry climate, clearly demonstrates that traditional knowledge, when applied with modern needs, can effectively address water scarcity. Such methods are low-cost, eco-friendly, and community-driven. They help recharge groundwater, ensuring water availability for crops and daily use, especially during dry seasons.
4. Option (B) is correct
   Explanation: In states like Punjab and Haryana, the widespread use of tube wells for irrigation—especially for water-intensive crops like paddy—has overdrawn groundwater far beyond its natural recharge rate, caused lowering of the water table, resulting in dry wells and long-term water scarcity.
5. Option (C) is correct
   Explanation: In ancient India, people built stepwells, tanks, canals, and baolis using local knowledge and collective effort to manage water effectively. These systems were well-adapted to the regional climate and topography, showing deep understanding of sustainable water use. This reflects that communities actively participated in water conservation long before modern engineering

ASSERTION-REASON QUESTIONS

1. Option (A) is correct
   Explanation: Assertion is true: This phrase was used by Jawaharlal Nehru to highlight the importance of such projects in India's development.
   Reason is also true. Multipurpose projects serve multiple functions like irrigation, hydroelectric power, water supply, and flood control.
2. Option (C) is correct
   Explanation: Assertion is true because groundwater levels are falling rapidly in states like Punjab, Haryana, Rajasthan, and others due to over-extraction.
   Reason is false because over-irrigation using tube wells does not increase the water table—it actually lowers it by extracting water faster than it can be replenished.
3. Option (A) is correct
   Explanation: Assertion is true because rainwater harvesting is an eco-friendly and cost-effective method to conserve water.
   Reason is also true, as it directly recharges groundwater and reduces pressure on rivers, lakes, and reservoirs.
   Both assertion and reason are true and reason correctly explains the assertion.

4. Option (C) is correct

Explanation: Assertion is true because many rivers in India, especially in the peninsular region, are seasonal, and water availability varies widely due to regional and seasonal rainfall patterns.

Reason is false because India does not receive uniform rainfall. It is concentrated mainly during the monsoon season and is unevenly distributed across regions.

VERY SHORT ANSWER TYPE QUESTIONS

1. **Reason for Water Scarcity:** Regions like Cherrapunji face water scarcity because rainfall is highly seasonal and intense, causing most water to run off quickly without being stored or absorbed. Also, the lack of proper water conservation infrastructure leads to poor groundwater recharge.

   One Solution: Rainwater harvesting can help by collecting and storing rainwater during the monsoon, which can then be used during dry periods.

2. **Causes:**
   (i) Excessive use of tube wells for irrigation, especially for water-intensive crops like paddy.
   (ii) Free or highly subsidised electricity, encouraging over-extraction of groundwater.

   Consequence: Falling water tables, which lead to drying of wells, increased cost of irrigation, and long-term water scarcity.

3. Purposes Served:
   (i) Irrigation: Provides water for agricultural fields across large areas.
   (ii) Hydroelectricity Generation: Produces renewable energy by using flowing water.

   Problem:
   Such projects can cause displacement of people, submergence of forests, and disruption of local ecosystems, leading to loss of biodiversity.

4. Khadin system used in Rajasthan.

   Contribution to Sustainable Use: Khadins collect and store rainwater in an earthen embankment, allowing moisture to seep into the soil, which helps in recharging groundwater and supporting crops without overusing external water sources.

5. **Social Impact:** Displacement of local and tribal communities, leading to loss of homes, livelihood, and cultural identity.

   Environmental Impact: Submergence of forests and wildlife habitats, resulting in loss of biodiversity and ecological imbalance.

6. (i) Uneven and seasonal distribution of rainfall: Most rain falls during a few monsoon months, leaving many regions dry for the rest of the year.
   (ii) Overuse and wastage of water: Excessive withdrawal for agriculture, industry, and domestic use, often without recycling or conservation, leads to depletion.

SHORT ANSWER TYPE QUESTIONS

1. **(i) Seasonal Concentration of Rainfall:** Most of India's rainfall occurs during a few monsoon months, leading to dry conditions in the remaining part of the year.
   (ii) Uneven Distribution: Rainfall is not uniform across regions — while some areas face floods, others receive very little rain, causing regional water shortages.
   (iii) Poor Water Management and Storage: Lack of proper infrastructure for rainwater harvesting, storage, and groundwater recharge leads to inefficient use and wastage of rainwater.

2. **(i) Displacement of People:** Large dams often submerge villages and forests, forcing thousands of people, especially tribal communities, to leave their homes and livelihoods.
   (ii) Loss of Biodiversity: Submerged forests and altered river flows destroy natural habitats, affecting wildlife and aquatic ecosystems.
   (iii) Ecological Imbalance: Dams disrupt natural river systems, affecting flood cycles, sediment flow, and groundwater recharge, leading to long-term environmental damage.

3. Rainwater harvesting is the practice of collecting and storing rainwater for future use, mainly to recharge groundwater or for direct consumption in irrigation and domestic use.

   Two Traditional Methods:
   (i) Khadin (Rajasthan): An earthen embankment is built to collect rainwater, which slowly infiltrates into the soil and recharges groundwater, supporting agriculture in arid regions.
   (ii) Tankas (Gujarat and Rajasthan): Underground tanks or cisterns are built to store rainwater collected from rooftops, primarily used for drinking and household purposes.

4. **(i) Decline in Water Table:** Continuous overuse lowers the groundwater level, making it harder and more expensive to access water.

(ii) **Drying of Wells and Borewells:** Excessive extraction leads to wells running dry, especially in summer, affecting irrigation and drinking water supply.

(iii) **Land Subsidence:** In some areas, overuse of groundwater causes the land to sink, damaging buildings, roads, and natural drainage systems.

5. A multipurpose project is a large-scale water resource development programme designed to serve multiple purposes like irrigation, hydroelectric power generation, water supply, flood control, and navigation.

Benefits:

(i) **Irrigation Support:** Provides water to agricultural fields, boosting food production.

(ii) **Hydroelectric Power Generation:** Produces renewable energy, reducing dependency on fossil fuels.

Drawback: May cause displacement of people and submergence of forests, leading to social and environmental problems.

6. (i) **Khadin (Rajasthan):** An earthen embankment built across a slope to collect rainwater, allowing it to percolate and improve soil moisture for crop cultivation.

(ii) **Zabo System (Nagaland):** A method of collecting rainwater on hill slopes and using it for irrigation and livestock without soil erosion.

(iii) **Johads (Haryana and Rajasthan):** Small earthen check dams built to conserve rainwater and recharge groundwater, supported and maintained by local communities.

CASE BASED QUESTIONS

1. (i) Water scarcity in most cases is caused by over-exploitation, excessive use and unequal access to water among different social groups.

(ii) People of Rajasthan have to travel long distances for collecting water, having a submersible water tank would solve the purpose of water.

(iii) Water conservation is crucial to provide clean water for humans to sustain life. Conservation of water requires a lot concerted efforts from every person in the world. We can take following steps:

(1) Constructing sophisticated hydraulic structures like dams built of stone rubble, reservoirs or lakes, embankments and canals for irrigation.

(2) Rain water harvesting. (Any one)

2. (i) The family emergency kit should include items such as:

(1) Portable radio/ transistors

(2) Torch

(3) Spare Batteries

(4) First Aid Box

(5) Essential Medicines (such as ORS)

(6) Essential Foods (dry food items, drinking water)

(7) Matchboxes, Candles and other essential supplies. (Any two)

(ii) These items are crucial to ensuring survival and maintaining basic necessities during flood situations.

(iii) (1) It is recommended to move to safe areas along with your family members.

(2) To move to safe areas such as relief camps, evacuation centers, or elevated grounds where shelter can be taken.

(3) Additionally, individuals should turn off power and gas connections before leaving their houses to prevent potential hazards. (Any two)

3. (i) Narmada Bachao Andolan

(ii) The big dams have been unsuccessful in controlling floods at the time of excessive rainfall because big dams release water from dams during heavy rains aggraved the flood situation.

(iii) (1) Generation of electricity

(2) Canal for irrigation

(3) Soil conservation in nearby areas. (Any two)

4. (i) (1) It is an inexpensive method of conservation of water.

(2) Common people can also afford it.

(3) Water harvesting techniques are environmentally friendly. (Any one)

(ii) (1) Rooftop rainwater is collected using a PVC pipe.

(2) Filtered using sand and bricks.

(3) Underground pipe takes water to sump for immediate usage.

(4) Excess water from the sump is taken to the well.

(5) Water from the well recharge the underground.

(6) Take water from the well.

(iii) (1) Hydraulic structures.

(2) In hilly regions/people-built diversion channels like the guls or kuls for agriculture.

(3) Roof-top rainwater harvesting was practised in Rajasthan.
(4) In the flood plains of Bengal people developed inundation channels to irrigate their fields.
(5) Khadins, Johads and Tanks are the forms of rainwater harvesting practised in Rajasthan. (Any two)

5. (i) (1) Inundation channels of Bengal.
(2) Khadins of Rajasthan.
(3) Johads of Rajasthan (Any two)

(ii) (1) They have arranged underground tanks or tankas for storing water.
(2) They have a well developed roof top rainwater harvesting system (palarpani) and were built inside the main house or courtyard.
(3) It is a reliable source of drinking water.
(4) It beats the summer heat as it would keep the room cool. (Any one)

(iii) (1) Rainwater harvesting is used to meet peoples and regions water needs.
(2) Rain water can be used by building diversion channels used for agriculture.
(3) They can be stored as drinking water particularly in Rajasthan.
(4) Rainwater harvesting is used to maintain water in tanks.
(5) Rainwater harvesting is used to maintain room temperature through tanks and ducting. (Any two)

6. (i) Women collected and stored water by balancing many 'matkas' (earthen pots) and travelling long distances to get water.

(ii) Water scarcity is caused due to the variations in seasonal and annual precipitation, but water scarcity in most cases is caused by over- exploitation, excessive use and unequal access to water among different social groups.

(iii) Yes, rain water harvesting can help as agricultural fields were converted into rain fed storage structures that allowed the water to stand and moisten the soil like the 'khadins' in Jaisalmer and 'Johads' in other parts of Rajasthan. 'Rooftop rainwater harvesting' was commonly practised to store drinking water, particularly in Rajasthan.

LONG ANSWER TYPE QUESTIONS

1. **(i) Overuse of Water Resources:** Excessive withdrawal of water for agriculture (especially for water-intensive crops like paddy and sugarcane), industries, and domestic use leads to depletion.

(ii) Uneven and Seasonal Distribution of Rainfall: Most rainfall occurs during a few monsoon months, causing water shortages in non-monsoon periods and in arid regions.

(iii) Groundwater Depletion: Over-extraction through tube wells, particularly in states like Punjab and Haryana, lowers water tables.

(iv) Water Pollution: Discharge of untreated industrial waste, sewage, and chemicals into rivers and lakes makes water unfit for consumption.

(v) Poor Water Management and Wastage: Inefficient irrigation techniques, leakages in pipelines, and lack of rainwater harvesting contribute to wastage and scarcity.

Long-Term Solution:

Promotion of Rainwater Harvesting and Sustainable Water Management Practices: This includes rooftop harvesting, building check dams, reusing wastewater, and educating communities to use water wisely.

2. **Objectives of Multipurpose River Valley Projects:**

Multipurpose river valley projects are designed to manage water resources for multiple uses simultaneously, such as irrigation, flood control, hydroelectric power generation, water supply for domestic and industrial use, and inland navigation and recreation

Benefits:

(i) **Irrigation Support:** They provide a reliable water source for agriculture, increasing crop yields and reducing dependence on rainfall.

(ii) **Electricity Generation:** Hydroelectric power stations built on dams generate clean and renewable energy.

(iii) Flood Control: Dams regulate river flow and help prevent floods in downstream areas.

(iv) **Water Storage and Supply:** They ensure year-round water availability for domestic and industrial purposes.

(v) **Employment and Development:** These projects create jobs and contribute to regional economic development.

Two Social or Environmental Concerns:

(i) **Displacement of People:** Large-scale construction often leads to the forced relocation of thousands, especially tribal and rural communities, disrupting their lives and livelihoods.

(ii) **Ecological Impact:** Submergence of forests, biodiversity loss, and changes in river ecosystems affect wildlife and natural habitats.

3. (i) **Khadin (Rajasthan):** An earthen embankment is constructed to harvest surface runoff, which slowly seeps into the soil and helps retain moisture for crop cultivation.

   (ii) **Zabo System (Nagaland):** A unique hill-based method that collects rainwater from hilltops and uses it for irrigation, livestock, and domestic use without causing soil erosion.

   (iii) **Tankas (Gujarat and Rajasthan):** Underground tanks built to store rooftop rainwater, especially in arid areas, for drinking and household use during dry months.

   (iv) **Johads (Haryana and Rajasthan):** Small earthen check dams built by villagers to conserve rainwater, recharge groundwater, and restore wells and ponds.

   (v) **Kuls (Himachal Pradesh):** Channels dug out on the hillsides to divert glacial meltwater to village fields for irrigation, maintained by local communities.

4. (i) **Rainwater Harvesting (Individual/ Community Level):** Installing rooftop rainwater harvesting systems in homes and institutions helps recharge groundwater and reduce reliance on external sources.

   (ii) **Promoting Drip and Sprinkler Irrigation (Government/Farmer Level**): These modern irrigation techniques minimise water wastage and are ideal for water-scarce areas.

   (iii) **Recycling and Reusing Water (Individual/ Urban Planning):** Treated wastewater from households and industries can be reused for gardening, flushing, and industrial cooling.

   (iv) **Spreading Awareness and Education (Community Level):** Conducting campaigns to educate people about responsible water use, leak repair, and daily water-saving habits.

   (v) **Strengthening Water Policies and Enforcement (Government Level):** Implementing strict laws to regulate over-extraction of groundwater and ensuring proper maintenance of water bodies.