

UNIQUE STUDY POINT

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Class: X	Subject: Science	Session: 2025-26
Chapter: 03 - Water Resources	Time: 1½ Hours	Max. Marks: 40

General Instructions:

1. All questions are compulsory.
2. This question paper contains 20 questions divided into five sections A, B, C, D and E.
3. Section A contains 10 MCQs of 1 mark each.
4. Section B contains 4 questions of 2 marks each.
5. Section C contains 3 questions of 3 marks each.
6. Section D contains 1 question of 5 marks.
7. Section E contains 2 Case Study Based questions of 4 marks each.

SECTION A - Multiple Choice Questions (1 mark each)

- Q1.** What ensures that water is a renewable resource?
- (a) Ocean currents
 - (b) Hydrological cycle
 - (c) Groundwater recharge
 - (d) Rainfall patterns
- Q2.** Which river in the Damodar valley was known as the 'river of sorrow'?
- (a) Ganga
 - (b) Yamuna
 - (c) Damodar
 - (d) Narmada
- Q3.** A dam refers to:
- (a) The structure only
 - (b) The reservoir only
 - (c) Both structure and reservoir
 - (d) The spillway only
- Q4.** Which section of a dam allows water to flow either intermittently or continuously?
- (a) Foundation
 - (b) Spillway or weir
 - (c) Embankment
 - (d) Reservoir
- Q5.** Multi-purpose projects were thought of as the vehicle that would:

- (a) Lead to environmental conservation
- (b) Lead to development and progress
- (c) Prevent water pollution
- (d) Reduce population

Q6. What happens to sediment flow when rivers are dammed?

- (a) It increases downstream
- (b) It remains unchanged
- (c) It becomes poor and excessive at reservoir bottom
- (d) It flows faster

Q7. In the flood plains of Bengal, what did people develop for irrigation?

- (a) Kuls
- (b) Tankas
- (c) Inundation channels
- (d) Johads

Q8. In rooftop rainwater harvesting in Rajasthan, which spell of rain is usually not collected?

- (a) First spell
- (b) Second spell
- (c) Last spell
- (d) All spells are collected

Q9. In western Rajasthan, why is the practice of rooftop rainwater harvesting declining?

- (a) Lack of rain
- (b) Availability of water from Indira Gandhi Canal
- (c) High cost
- (d) Government ban

Q10. How many litres of water enters the bamboo pipe system in Meghalaya's drip irrigation?

- (a) 5-10 litres
- (b) 10-15 litres
- (c) 18-20 litres
- (d) 25-30 litres

SECTION B - Short Answer Questions (2 marks each)

Q11. Distinguish between water scarcity due to natural causes and water scarcity due to over-exploitation.

Q12. What is the significance of the statement "Water, Water Everywhere, Not a Drop to Drink"? Explain with context to water availability in India.

Q13. Name two ecological consequences of shifting to water-intensive crops due to irrigation.

Q14. Why do many houses in Rajasthan still maintain tankas despite availability of tap water from Indira Gandhi Canal?

SECTION C - Short Answer Questions (3 marks each)

Q15. How has urbanization contributed to water scarcity in Indian cities? Explain with three points.

Q16. Explain how dams were expected to overcome the handicap of India's colonial past according to Jawaharlal Nehru.

Q17. How do multi-purpose dams lead to water-borne diseases, pests and pollution?

SECTION D - Long Answer Question (5 marks)

Q18. Describe in detail the rooftop rainwater harvesting systems practiced in different parts of India. Include examples from at least three different regions and explain how modern adaptations are being carried out.

SECTION E - Case Study Based Questions (4 marks each)

Q19. Read the following case study and answer the questions that follow:

Rooftop rainwater harvesting is the most common practice in Shillong, Meghalaya. It is interesting because Cherapunjee and Mawsynram situated at a distance of 55 km from Shillong receive the highest rainfall in the world, yet the state capital Shillong faces acute shortage of water. Nearly every household in the city has a rooftop rainwater harvesting structure. Nearly 15-25% of the total water requirement of the household comes from rooftop water harvesting.

- (a) Why is it interesting that Shillong practices rainwater harvesting? (1 mark)
- (b) How far are Cherapunjee and Mawsynram from Shillong? (1 mark)
- (c) What percentage of household water requirement comes from rooftop harvesting in Shillong? (1 mark)
- (d) Why does Shillong face water shortage despite nearby areas receiving highest rainfall? (1 mark)

Q20. Read the following case study and answer the questions that follow:

Dams were traditionally built to impound rivers and rainwater that could be used later to irrigate agricultural fields. Today, dams are built not just for irrigation but for electricity generation, water supply for domestic and industrial uses, flood control, recreation, inland navigation and fish breeding. Hence, dams are now referred to as multi-purpose projects where the many uses of the impounded water are integrated with one another. For example, in the Sutluj-Beas river basin, the Bhakra-Nangal project water is being used both for hydel power production and irrigation.

- (a) What was the traditional purpose of building dams? (1 mark)
- (b) Name any three modern purposes of dams apart from irrigation. (1 mark)
- (c) Why are dams now called multi-purpose projects? (1 mark)
- (d) Give an example of a multi-purpose project mentioned in the passage. (1 mark)

SECTION A - Answers to MCQs

Ans 1. (b) Hydrological cycle

All water moves within the hydrological cycle ensuring that water is a renewable resource through processes of evaporation, condensation, precipitation, and collection.

Ans 2. (c) Damodar

The Damodar river in the Damodar valley region was known as the 'river of sorrow' due to frequent flooding that troubled the people, as mentioned in the popular Bhadu song.

Ans 3. (b) The reservoir only

A dam is defined as the reservoir rather than the structure itself. It is a barrier across flowing water that creates a reservoir, lake or impoundment.

Ans 4. (b) Spillway or weir

Most dams have a section called a spillway or weir over which or through which it is intended that water will flow either intermittently or continuously.

Ans 5. (b) Lead to development and progress

Multi-purpose projects launched after Independence were thought of as the vehicle that would lead the nation to development and progress, overcoming the handicap of its colonial past.

Ans 6. (c) It becomes poor and excessive at reservoir bottom

Regulating and damming of rivers affect their natural flow causing poor sediment flow and excessive sedimentation at the bottom of the reservoir.

Ans 7. (c) Inundation channels

In the flood plains of Bengal, people developed inundation channels to irrigate their fields using floodwater from rivers.

Ans 8. (a) First spell

The first spell of rain was usually not collected in rooftop rainwater harvesting as this would clean the roofs and the pipes. The rainwater from subsequent showers was then collected.

Ans 9. (b) Availability of water from Indira Gandhi Canal

In western Rajasthan, the practice of rooftop rainwater harvesting is on the decline as plenty of water is available due to the perennial Indira Gandhi Canal.

Ans 10. (c) 18-20 litres

In Meghalaya's bamboo drip irrigation system, about 18-20 litres of water enters the bamboo pipe system, which gets transported over hundreds of metres and finally reduces to 20-80 drops per minute.

SECTION B - Answers to Short Answer Questions

Ans 11.

Water Scarcity - Natural Causes	Water Scarcity - Over-exploitation
Caused by low rainfall, drought conditions, and variations in seasonal/annual precipitation patterns	Caused by excessive use and over-exploitation of water resources by humans
Common in arid and semi-arid regions like deserts of Rajasthan	Common in areas with high population density and intensive agriculture/industry, even with adequate rainfall

Ans 12.

This statement signifies that despite abundance of water, it may not be suitable for drinking or use.

Context in India:

- **Pollution:** Even if there is ample water to meet the needs, much of it may be polluted by domestic and industrial wastes, chemicals, pesticides and fertilizers, making it hazardous for human use.
- **Example:** After heavy rainfall causing floods in Kolkata, people still had to collect drinking water because floodwater was not suitable for consumption. Similarly, Kashmir earthquake survivors had to carry water despite being surrounded by snow.

Ans 13.

Two ecological consequences:

1. **Salinisation of soil:** Irrigation has changed cropping patterns with farmers shifting to water-intensive and commercial crops. This has great ecological consequences like salinisation of the soil, where salt accumulates in the soil making it less fertile.
2. **Depletion of groundwater:** Water-intensive crops require more irrigation water, leading to over-extraction of groundwater. This causes falling groundwater levels and affects long-term water sustainability.

Ans 14.

Many houses in Rajasthan still maintain tankas despite availability of tap water from Indira Gandhi Canal because:

- **Taste preference:** Some houses still maintain the tankas since they do not like the taste of tap water from the canal.
- **Quality perception:** Rainwater or 'palar pani' is considered the purest form of natural water and is preferred over canal water.
- **Traditional reliability:** Tankas provide a reliable backup water source during summers or times when canal water supply may be interrupted.

SECTION C - Answers to Short Answer Questions

Ans 15.

How urbanization has contributed to water scarcity:

1. **Large and dense populations:** Multiplying urban centres with large and dense populations have added to water requirements. The concentration of many people in limited areas puts

enormous pressure on available water resources.

2. **Urban lifestyles:** Urban lifestyles have increased per capita water consumption through multiple uses - washing machines, showers, swimming pools, air conditioning, lawn maintenance, etc. This has further aggravated the water scarcity problem.
3. **Individual groundwater extraction:** Most housing societies or colonies in cities have their own groundwater pumping devices to meet their water needs. This unregulated extraction by numerous households leads to over-exploitation and depletion of fragile groundwater resources in several cities.

Example: Many Indian cities are examples where the area may have ample water resources but still faces water scarcity due to large urban population and lifestyle demands.

Ans 16.

Nehru's vision of dams overcoming colonial handicap:

Jawaharlal Nehru proudly proclaimed the dams as the 'temples of modern India'. His reasoning was:

1. **Integration of agriculture and village economy:** Dams would integrate development of agriculture and the village economy, which was neglected during colonial rule. This would help revive rural areas and improve agricultural productivity.
2. **Rapid industrialization:** Multi-purpose projects would facilitate rapid industrialization by providing electricity for industries. This was essential for economic independence and self-reliance after colonial exploitation.
3. **Growth of urban economy:** The power generated from dams would support the growth of urban economy through industrial development, helping India modernize and develop economically.

Thus, dams were seen as instruments that would simultaneously develop both rural and urban sectors, helping India overcome the economic backwardness left by colonial rule.

Ans 17.

Multi-purpose dams leading to diseases, pests and pollution:

1. **Water-borne diseases:**
 - Stagnant water in reservoirs creates breeding grounds for disease-causing organisms and mosquitoes
 - Standing water bodies promote vector-borne diseases like malaria, dengue, and Japanese encephalitis
 - Contamination of stored water can lead to spread of water-borne diseases in downstream areas
2. **Pests:**
 - Large water bodies attract various pests and insects
 - Changes in ecosystem can lead to proliferation of certain pest species
 - Aquatic weeds may grow excessively, harboring pests
3. **Pollution:**
 - Excessive use of water from multi-purpose projects encourages wasteful practices and pollution
 - Agricultural runoff with pesticides and fertilizers accumulates in reservoirs
 - Decomposition of submerged vegetation releases harmful gases and pollutants
 - Industrial and urban waste disposal into water bodies connected to dam systems

Ans 18.

Rooftop Rainwater Harvesting Systems in India:

Rooftop rainwater harvesting is an ancient practice in India that continues to be relevant today with modern adaptations.

1. Rajasthan - Tankas System:

Traditional Method:

- In semi-arid and arid regions of Rajasthan (Bikaner, Phalodi, Barmer), almost all houses traditionally had underground tanks or tankas
- Tankas were built inside the main house or courtyard and connected to sloping roofs through pipes
- Rain falling on rooftops would travel down pipes and be stored in underground tankas
- First spell of rain was not collected (to clean roofs/pipes); subsequent rainwater was stored
- Water could be stored till next rainfall; considered purest form (palar pani)
- Underground rooms adjoining tankas helped beat summer heat

Modern Status: Practice declining due to Indira Gandhi Canal, though some houses maintain tankas as they prefer taste of rainwater over tap water.

2. Meghalaya - Shillong:

Modern Practice:

- Rooftop rainwater harvesting is most common practice in Shillong
- Nearly every household has a rooftop rainwater harvesting structure
- 15-25% of total household water requirement comes from rooftop harvesting
- Interesting because despite Cherrapunjee and Mawsynram (55 km away) receiving highest rainfall in world, Shillong faces acute water shortage

Significance: Demonstrates that even areas near high rainfall zones need rainwater harvesting due to geographical and infrastructural constraints.

3. Karnataka - Gendathur Village:

Modern Adaptation:

- Gendathur, a remote backward village in Mysuru district, has successfully adapted rooftop rainwater harvesting
- Nearly 200 households have installed this system
- Village receives 1,000 mm annual precipitation
- With 80% collection efficiency and about 10 fillings, each house collects about 50,000 litres annually
- From 200 houses, total rainwater harvested annually amounts to 1,00,000 litres (should be 100,00,000 litres total)
- Village earned rare distinction of being "rich in rainwater"

System Components:

- Rooftop rainwater collected using PVC pipe
- Filtered using sand and bricks
- Underground pipe takes water to sump for immediate usage
- Excess water from sump is taken to well
- Water from well recharges underground aquifer
- Can take water from well later when needed

4. Tamil Nadu - Legal Framework:

Modern Initiative:

- First state to make rooftop rainwater harvesting compulsory for all houses
- Legal provisions exist to punish defaulters
- State-wide implementation across urban and rural areas
- Demonstrates government support for traditional water conservation methods

Modern Adaptations Being Carried Out:

1. Technical Improvements:

- Use of PVC pipes instead of traditional materials
- Sand and brick filters for purification
- Underground sumps with overflow systems
- Groundwater recharge through wells

2. Community Approach:

- Village-level implementation (like Gendathur)
- Sharing of best practices and knowledge
- Community ownership of water resources

3. Policy Support:

- Mandatory regulations in states like Tamil Nadu
- Integration with government water supply schemes
- Recognition and incentives for adopters

4. Scientific Integration:

- Calculation of collection efficiency
- Proper sizing of storage structures based on rainfall and roof area
- Water quality testing and monitoring

Conclusion: Rooftop rainwater harvesting, practiced traditionally across India, is being successfully revived with modern adaptations, demonstrating that indigenous knowledge combined with contemporary technology can address water scarcity effectively.

SECTION E - Answers to Case Study Based Questions

Ans 19.

(a) It is interesting that Shillong practices rainwater harvesting because Cherrapunjee and Mawsynram, situated just 55 km away, receive the highest rainfall in the world, yet the state capital Shillong faces acute shortage of water. This paradox makes the practice noteworthy.

(b) Cherrapunjee and Mawsynram are situated at a distance of 55 km from Shillong.

(c) Nearly 15-25% of the total water requirement of the household comes from rooftop water harvesting in Shillong.

(d) Shillong faces water shortage despite nearby areas receiving highest rainfall because:

- Geographical factors prevent water from reaching Shillong despite high rainfall nearby
- Lack of proper infrastructure to transport water from high rainfall areas
- Topographical constraints and drainage patterns direct rainfall away from Shillong
- Water flows down from surrounding areas and is not retained in Shillong plateau

Ans 20.

(a) The traditional purpose of building dams was to impound rivers and rainwater that could be used later to irrigate agricultural fields.

(b) Three modern purposes of dams apart from irrigation are:

1. Electricity generation (hydroelectric power)
2. Water supply for domestic and industrial uses
3. Flood control

(Other purposes include: recreation, inland navigation, and fish breeding)

(c) Dams are now called multi-purpose projects because the many uses of the impounded water are integrated with one another. Instead of serving just one purpose (irrigation), modern dams serve multiple purposes simultaneously - generating electricity, providing water supply, controlling floods, supporting recreation, etc.

(d) The Bhakra-Nangal project in the Sutluj-Beas river basin is an example of a multi-purpose project where water is being used both for:

- Hydel power production (electricity generation)
- Irrigation of agricultural fields

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