Grade X - Geography

Lesson 3. Water Resources

Objective Type Questions

(1 Mark each)

I. Multiple choice questions

1. Which one of the following statements is not an argument in favour of multi-purpose river projects?

a. Multi-purpose projects bring water to those areas which suffer from water scarcity.

b. Multi-purpose projects by regulating water flow help to control floods.

c. Multi-purpose projects lead to large-scale displacements and loss of livelihood.

d. Multi-purpose projects generate electricity for our industries and our homes

2. Which is not a source of fresh water?

a. Glaciers and ice sheets

b. Groundwater

c. Surface run off

d. Oceans

3. The freshwater is mainly obtained from surface runoff and groundwater that is continually being renewed and recharged through the _____.

a. sulphur cycle

b. rock cycle

c. hydrological cycle

d. none of the above

4. 96.5 per cent of the total volume of the world's water is estimated to exist as _____ and only 2.5 per cent as _____.

a. freshwater, oceans

b. oceans, freshwater

c. groundwater, oceans

d. None of the above

5. Which of the following is not a cause of water scarcity?

a. Growing population

b. Growing of water intensive crop

c. Expansion of irrigation facilities

d. Water harvesting technique

6. Bhakra Nangal River Valley Project is built on which river?

a. Sutlej-Beas

b. Ravi-Chenab

c. Ganga

d. Son

7. Hirakud Dam is constructed on which river?

a. Ganga
b. Indus
c. Manas
d. Mahanadhi

8. _____ proudly proclaimed the dams as the 'temples of modern India' as it would integrate the development of agriculture and the village economy with rapid industrialisation and growth of the urban economy

a. Sardar Patel
b. Jawaharlal Nehru
c. Mahatma Gandhi
d. Dr B.R.Ambedkar

9. Koyna Dam is one of the largest dams located in

a. Uttar Pradesh
b. Madhya Pradesh
c. Rajasthan
d. Maharashtra

10. Rihand Dam is located on river Rihand, a tributary of _____ river.

a. Sutlej
b. Son
c. Godavari
d. Brahmaputra

11. Water is being used both for hydel power production and irrigation from which of the following?

a. Bhakra-Nangal Dam
b. Sutlej-Beas River Basin
c. Hirakud Dam
d. Both B & C

12. Which one of the following is not the cause of water scarcity?

a. Rapid growth of population
b. Uneven distribution of water resources
c. Construction of dams and reserves
d. Increase in demand

13. Which state has made roof top rainwater harvesting structure compulsory to all the houses across the state?

a. Kerala b. Karnataka **c. Tamil Nadu** d. Andhra Pradesh

14. Which one of the following is not the example of Hydraulic structures in Ancient India?

a. Bhopal Lake
b. Lake Hauz Kauz
c. Construction of dams, Lakes
d. Damodar Valley Project

15. Water is a renewable resource because

a. it is being recycled by human beings
b. It is renewed and recharged through hydrological cycle.
c. it is being renewed through reduction
d. it can be reused again

16. Water scarcity occurs due to

i) low rainfall in a region ii. Large population

iii) over-exploitation iv. Unequal access

a. (i) and (ii) b. (ii) and (iii) c. (i) and (iv) **d. All of the above**

17. In semi-arid regions of Rajasthan the traditional system of storing drinking water in underground tanks are called

a. Dugwells b. Johads **c. Tankas** d. None of the above

I. Assertion & Reason

Directions: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

(A) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

(B) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(C) Assertion (A) is true but reason (R) is false.

(D) Assertion (A) is false but reason (R) is true.

1. Assertion (A) : Water is a renewable resource.

Reason (R) : Freshwater is mainly obtained from surface run off and ground water that is continually being renewed.

2. Assertion (A) : The availability of water resources varies over space and time.

Reason (R) : Availability of water resources helps in storing water.

Ans.: Option (C) is correct.

3. Assertion (A) : Dams are referred to as multi-purpose projects.

Reason (R) : Dams are built for irrigation, electricity generation, water supply for domestic and industrial use, flood control, recreation and fish breeding.

Ans.: Option (A) is correct.

4. Assertion (A) : Dams are built just for electricity generation.

Reason (R) : Dams were traditionally built to impound rivers and rainwater that could be used later to irrigate agricultural fields.

Ans.: Option (D) is correct.

5. **Assertion (A)** : Growing population is the main reason for water scarcity.

Reason (R) : Irrigation from tube wells and canals is responsible for water scarcity.

Ans.: Option (C) is correct.

In the given questions (Q.7 and Q.8), there are two statements marked as Assertion (A) and Reason (R). Read the statements and choose the correct option from the following:

a) Both A and R are wrong.

b) A is correct but R is wrong.

c) A is wrong but R is correct

d) Both A and R are true and R is the correct explanation of A.

6. **Assertion (A)** : Water is renewable resources.

Reason (R) : Fresh water is mainly obtained from surface run off and ground water that is continually being renewed.

Ans.: Option (D) is correct.

7. **Assertion (A)** : Dams are referred to as multi-purpose projects.

Reason (R) : Dams are built for irrigation, electricity generation, water supply for domestic and industrial use, flood control, recreation and fish breeding.

Ans.: Option (D) is correct.

I. Very Short Answer Type Questions

(1 Mark each)

1. **Name any one river valley project which has significantly contributed to the loss of forests.**

Ans. Sardar Sarovar Dam.

2. **Write the major source of fresh water in India.**
3. **What are the causes of water scarcity?**
4. **Which largest artificial lake was built in 11^{th} century?**

Ans. Bhopal Lake.

5. **On which river has the Hirakud Dam been constructed?**

Ans. River Mahanadi

6. **Which river is known as the 'River of Sorrow' in West Bengal?**

Ans. Damodar River.

7. Name two social movements which were against the multipurpose projects.

Ans. Narmada

8. The Nagarjuna Sagar Dam is built on which river?

Ans. Krishna River.

9. A 200 year old system of tapping stream and spring water prevalent in Meghalaya is known as _____.

Ans. Bamboo drip irrigation.

10. In flood plains of West Bengal people developed _____ to irrigate their fields.

Ans. Inundation channels

11. Narmada Bachao Andolan is a movement created against _____.

Ans. Sardar Sarovar Dam

12. By 2025, nearly 2 billion people will live in absolute water scarcity. [True/False]

Ans. True

13. 22 per cent of India's total electricity is produced from coal. [True/False]

Ans. False.

14. Tubewells are called the 'temples of modern India'. [True/False]

Ans. False.

15. Match the columns.

Column A	Column B
a) Sardar Sarovar	i) Satluj
b) Hirakud	ii) Bhopal Lake
c) River of sorrow	iii) Mahanadi
d) Largest artificial lake in the 11th century	iv) Narmada
e) Bhakra Nangal	v)Damodar

Ans. a) (iv), b) (iii), c) (v), d) (ii), e) (i)

16. What is hydrological cycle?

Ans. Continuous circulation of water between hydrosphere, atmosphere and lithosphere, in which water changes its physical state, is called hydrological cycle.

17. How much of world's water exists as oceans and freshwater?

Ans. i) As oceans - 96.5%

ii) As freshwater- 2.5%

18. Name two places where 70 per cent of the freshwater is found as ice sheets and glaciers.

Ans. Antarctica and Greenland

19. From where is freshwater obtained?

Ans. Freshwater can be obtained directly from precipitation, surface run off and groundwater.

20. Which are the resources of fresh water?

Ans. Precipitation, Surface run off, Groundwater

21. What are the main causes of water scarcity?

Ans. Growing population and less rainfall

22. Apart from growing population and low rainfall, write any low causes of water scarcity,

Ans. Over exploitation, excessive use and unequal access.

23. State one reason for conservation of water resources.

Ans. To ensure food security because water is needed for crop production.

24. Name the largest artificial lake built in the 11^{th} century.

Ans. Bhopal Lake

25. Name the tank built in Delhi by Itrutmish for supplying water to Siri Fort area.

Ans. Hauz Khas Tank

26. What is a dam?

Ans. A dam is a barrier across flowing water that obstructs, directs or retards the flow often creating a reservoir.

27. How dams are classified on the basis of structure and material used?

Ans. Based on structure and the material used, dams are classified as timber dams, embankment dams or masonary dams with several sub-types.

28. Who proclaimed the dams as the 'temples of modern India'?

Ans. Pandit Jawaharlal Nehru.

29. Name any two movements which had their origin in multi-purpose projects.

Ans. Narmada Bachao Andolan and Tehri Dam Andolan

30. Who benefits from multi-purpose projects? Name any two sections of society.

Ans. i) Land owners

ii) Large farmers

iii) Industrialists

31. Name the four states which are covered under the Sardar Sarovar Project.

Ans. Maharastra, Madhya Pradesh, Gujarat and Rajasthan

32. Name two states which are involved in Krishna-Godavaro dispute.

Ans. Karnataka and Andhra Pradesh.

33. What is ironical about dams?

Ans. The dams constructed to control floods have increased the possibility of floods because of sedimentation in the reservoirs.

34. What cab ne the viable alternative to dams?

Ans. Water harvesting systems

35. What are the diversion channels of Western Himalayas called?

Ans. They are called kuls or guls.

36. Name two rainwater harvesting structures built in Rajasthan.

Ans. Khaduans and Johads

37. What is palar pani?

Ans. It is rainwater.

38. What do the people in Rajasthan do to beat the summer heat?

Ans. They have built underground rooms cool.

39. Name the village in Karnataka which has earned a rare distinction of being rich in rainwater.

Ans. Gendathur

II.Very Short Answer Type Questions

(1 Mark each)

1. Which water is recharged by roof-top rainwater harvesting technique?

Ans. Ground water

2. In which region, people built 'Guls' or 'Kuls' for irrigation?

Ans. Western Himalayas

3. In which state Bamboo Drip Irrigation, is prevalent?

Ans. Meghalaya.

I. Short Answer Type Questions

(3 Marks each)

1. Mention any four main objectives of multipurpose river valley projects. Name any two Multipurpose Projects of India

OR

What is a multipurpose river valley project? Mention any four objectives of it.

A project where many uses of the impounded water are integrated with one another is known as multipurpose project. It is built for irrigation, power generation, water supply, flood control, recreation, etc.

2. Why did Jawaharlal Nehru proclaim the dams as the "temples of modern India"? Explain any three reasons.

Jawaharlal Nehru proclaimed the dams as the "temples of modern India" because:

i. They eliminate or reduce flooding.

ii. Provide water for agriculture.

iii. Provide water for human and industrial consumption.

iv. Provide hydroelectricity for houses and industries.

3. How have intensive industrialization and urbanization posed a great pressure on existing fresh water resources in India? Explain.

OR

How does urbanization and urban lifestyle lead to over exploitation of water resources? Explain.

OR

How have intensive industrialization and urbanization posed a great pressure on existing fresh water resources in India? Explain.

Post independent India witnessed intensive industrialisation and urbanisation.

i. Arrival of MNC's: Apart from fresh water they require electricity, which comes from hydroelectric power.

ii. Multiplying urban centres with large and dense populations and urban life styles 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.

4. List any three advantages and three disadvantages of multipurpose river project.

OR

What are the advantages and disadvantages of multipurpose river project?

5. Highlight any three hydraulic structures as part of water management programmes initiated in ancient India along with the period when they were built.

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

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

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

iii. In the 11th century, Bhopal Lake, one of the largest artificial lakes of its time was built.

iv. The tank in Hauz Khas, Delhi was constructed by Iltutmish in the 14th century to supply water to the Siri Fort Area.

6. Why is groundwater a highly overused resource? Groundwater is a highly overused resource because of the following reasons:

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 needs.

7. 'Three-fourths of the earth's surface is covered with water but there is still scarcity of water across the globe.' Explain giving three reasons.

OR

Why is the need for water increasing day-by-day? Explain three reasons.

Ans. Water scarcity is due to the following reasons.

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

b) Rapid urbanization is another factor for water scarcity.

c) Rapid increase in population that demands more and more water.

d) Industrialization is another cause. Large industrial houses are using more and more water. They also require more water to generate electricity.

e) Rising income levels also create more demand for water.

8. Why do we need to conserve water resource?

Ans. It is necessary to conserve water resources due to the following reasons:

a) To safeguard ourselves from health hazards: Polluted water is not good for health. It may cause various kinds of water borne diseases. Water is polluted by domestic and industrial wastes, chemicals, pesticides and fertilizers make in hazardous for human use.

b) To ensure food security: Sufficient water is required for growing crops to meet the food requirement in the country. Shortage of water may lead to condition of droughts and failure of crops.

c) To prevent degradation of our natural ecosystems: Over exploitation and mismanagement of water resources will impoverish this resource and cause ecological crisis that may have profound impact on our lives. We cannot imagine a life without water. This is very necessary to conserve water resources.

9. Is it possible that an area or region may have ample water resources but is still facing water scarcity? Explain with the help of three relevant examples.

Ans. Yes, it is possible that an area or region may have ample water resources but still faces water scarcity mainly due to the following reasons.

a) Many cities in India are facing this problem because of large and growing population, the increasing demand for water and unequal access to it. More water is needed for domestic purposes.

b) Water resources are exploited to irrigate agricultural areas. Due to expansion of agriculture to feed the growing population and to get higher food production, farmers have wells and tube wells in their farms to irrigate their fields and to increase their produce. As a result the underground water levels are falling tremendously and affecting water availability and food security.

c) Intensive industrialisation and urbanization has led to more demand for water. Industries exert pressure on fresh water resources. Industries also need power to run the,. Hydroelectric energy provides most of the power. Today hydroelectric power contributes about 22 per cent of the total electricity produced.

10. How can we control overexploitation and mismanagement of water resources? State any two points that should be kept in mind for efficient management of water.

Ans. Overexploitation and mismanagement of water resources can be controlled through conservation and management of these resources. Conservation can also prevent degradation of our natural ecosystem as well as control the ecological crisis that may arise due to its scarcity. Two points that should be kept in mind for efficient management of water are:

a) Prevention of water pollution, so that available water sources are not rendered unusable.

b) Integrated Water Resources Management should develop water saving technology and recycling and reuse of water. Rainwater harvesting should be promoted.

11. Mention a negative effect of irrigation. How can irrigation transform the social landscape?

OR

Explain any two consequences of changing crop pattern due to irrigation.

Ans. Irrigation has changed the cropping pattern of many regions with farmers shifting to cultivation of water intensive and commercial crops. This has great ecological consequences. It leads to water logging and consequent salinization of the soil. This is a negative effect of irrigation. As rich farmers have better access to irrigation they have earned more money due to the production of commercial crops. On the other hand, the landless poor who could not avail of its benefits have become poorer. Thus, irrigation has transformed the social landscape by increasing the social gap between rich landowners and the landless poor farmers.

12. Examine the ill effects of industrialisation and urbanisation on water resources.

OR

How have intensive industrialisation and urbanisation posed a great pressure on existing fresh water resources in India?

Ans. Industrialisation and urbanisation have aggravated water scarcity in India in the following ways.

a) Large industrial houses are exerting pressure in existing freshwater resources.

b) Industries, apart from being heavy users of water, also require power to run them.

c) Multiplying urban centres with large and dense population and urban lifestyles have not only added to water and energy requirement but further aggravated the problem. Water resources are being overexploited.

13. Describe any three hydraulic structure of ancient India.

Ans. Three examples of hydraulic structures of ancient India are as under:

a) Water harvesting system was built in the first century BC near Allahabad for channelling the flood waters of the Ganga.

b) During the times of Chandragupta Maurya, dams lakes and irrigation systems were constructed.

c) Bhopal Lake, one of the largest artificial lakes of that time, was built in the 11th century.

14. What is multipurpose river valley project? Give any four objectives of the multipurpose river valley projects.

Ans. The multipurpose river valley project is a project in which a dam is constructed on the river and stored water is then used in many ways like irrigation and power generation.

a) To check floods by regulating flow of water.

b) To generate hydropower for industries and our homes.

c) To provide irrigation facilities. This helps in increasing agriculture, productivity and bringing more area under cultivation.

d) To check soil erosion.

15. Explain any three reasons due to which large dams have come under great opposition in recent years. **OR**

"The dams that were constructed to control floods have triggered floods." Analyse the statement.

Ans. In the recent times, dams have come under great opposition because:

a) Construction of dams has resulted in problems like excessive sedimentation, waterlogging, soil erosion, sudden floods, large-scale deforestation, extinction of species. Displacement of communities and tribal communities losing their livelihood. Dams also fragment rivers, making it difficult for aquatic fauna to migrate, especially for spawning.

b) Dams that were built to control floods have triggered floods due to sedimentation in the reservoirs. Big dams have been unsuccessful in controlling floods at the time if excessive rainfall. The release of water from the dams during heavy rainfall worsens the situation.

c) Dams cause earthquakes, waterborne diseases and pollution due to excessive use of water.

16. 'Large multipurpose projects also lead to land degradation.' Explain.

Ans. Dams that have been seen as temples of modern India have not produced the desirable results. They are posing a situation of grave disaster of which land degradation is the major concern.

a) Regulating and damming of rivers with the construction of large multipurpose projects affect their natural flow causing poor sediment flow and excessive sedimentation at the bottom of reservoir.
b) Large reservoirs submerge large tracts of forests, flora and habitat of fauna.
c) Soil submersional leads to its decomposition over a period of time.

17. How have multipurpose projects and large dams been the cause of many new social movements?

OR

Why do local communities oppose multipurpose projects?

Ans. Multipurpose projects and large dams have been the cause of many social movements like Narmada Bachao Andolan and Tehri Dam Andolan. When multipurpose projects or dams are constructed , local people often have to give their land, livelihood and their control over resources. The local communities are displaced. The local people do not benefit from the project. The landowners, industrialists and large farmers benefit from the project.

a) Narmada Bachao Andolan is a Non-Govenmental Organization which mobilsed the people. Tribals, farmers and human right activitists against the Sardar Sarovar Dam, built across the Narmada river in Gujarat. The movement started with environmental issues, like trees being submerged under water. It became wider in its scope, when it demanded from the government full rehabilitation facilities for the displaced.
b) Irrigation has changed the cropping pattern in many regions. Farmers have shifted to water intensive and commercial crops. It led to conflict between rich landowners and poor farmers.
c) The Sabarmati farmers in Gujarat agitated when priority of water supply was given to urban areas especially during droughts.

18. Evaluate the role of large – scale developmental projects in accelerating the loss of forests in India.

Ans.

a) The forests were cleared for the construction of multi-purpose projects.

b) The reservoirs that are built on the flood plain also submerge the existing vegetarian and soil, leading to its decomposition over a period of time.

c) The trees were submerged under the dam water.

19. Mention three major sources of irrigation in India. Which source of irrigation is more popular in southern states? Why?

Ans. The three major sources of irrigation in India are:

a) Canals

b) Wells and tube wells

c) Tanks

Tank irrigation is most popular in southern states because these states mostly come under Deccan plateau which is not suitable for irrigation by canals.

20. Why is there a need to develop rainwater harvesting system in India? Explain.

Ans. There is a need to develop rainwater harvesting system because of the following reasons:-

a) Water harvesting system is a viable attentive both socio-economically and environmentally.

b) Due to increasing population demand for water is increasing in every phase of life, so rainwater harvesting system is essential.

c) There is uneven distribution of rainfall. Thus water has to be harvested for times of scarcity.

d) To recharge ground water and increase its level, rain water harvesting in necessary.

21. What is rainwater harvesting? State the objectives of rainwater harvesting.

Ans. Rainwater harvesting is an efficient method of water conservation and management. The techniques of collecting and storing rainwater directly or recharging it into the ground through artificial means to improve groundwater storage is called rainwater harvesting. It includes traditional methods like conversion of agricultural fields into rainfed storage structure locally known as 'Khadins' and;johads' in Rajasthan.

The objectives of rainwater harvesting are:

a) To prevent wastage and pollution of the monsoon rains.

b) To reduce run-off and control the flooding of roads.

c) To recharge and improve the quality of groundwater storage and raise water table.

d) To meet the demands of domestic water requirement during dry season.

e) To solve the problem of drinking water shortage especially in regions receiving less rainfall.

22. Describe any three different rainwater harvesting systems practised in india.

Ans. Rainwater harvesting is a system in which rainwater is collected through various techniques and then collected water is used in many ways.

a) Hilly region; in hilly region people built diversion channels like the 'guls' or 'kuls' in the western Himalayas for agriculture. With these channels rainwater is used in meaningful ways.

b) Arid region: In Rajasthan almost all houses had underground tanks. These tanks were part of a well-developed rooftop rainwater harvesting system. They were connected to the sloping roofs of the houses through a pipe. Rain falling in the rooftops would travel down the pipe and get stored in these underground 'tankas'.

c) Inundation canals were built in the flood plains of Bengal, to irrigate the fields.

23. Describe the procedure for rooftop rainwater harvesting.

OR

Describe the rooftop rainwater harvesting technique.

Ans. Rooftop rainwater harvesting involvers a number of steps as under.

a) Rooftop rainwater is collected using a PVC pipe.

b) Water is filtered by using sand as bricks.

c) Water is taken to the sump through underground pipes for immediate use.

d) Excess water from the sump is taken to the well.

e) Water from the well recharges the underground water.

f) Water is taken from the wells or is recharged through hand pumps.

II. Short Answer Type Questions

(3 Marks each)

1. What is Bamboo Drip Irrigation? Mention any two features of it.

i. 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.

(ii) Features:

(a) 18-20 litres of water enters the bamboo pipe system, get transported over hundreds of

meters and finally reduces to 20-80 drops per minute at the site of the plant.

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

2. Describe any three traditional methods of rainwater harvesting adopted in different parts of India.

OR

"Rain water harvesting system is viable alternative both socially, economically and environmentally". Support the statement with three examples.

OR

Describe any three different rain water harvesting systems practised in India.

i. In hilly and mountainous regions, people build diversion channels like 'gul' or 'kul' in Western Himalaya for agriculture.

ii. Roof-top rainwater harvesting was commonly practised to store drinking water particularly in Rajasthan and Gujarat.

iii. In West Bengal, people develop inundation channels to irrigate their fields.

iv. In semi-arid regions agricultural fields are converted into rain-fed storage structures that allowed the water to stand and moist the soil.

3. Explain the working of underground tanks as a part of roof top rainwater harvesting system practised in Rajasthan.

OR

How were the underground tanks beneficial to the people of Rajasthan? Explain.

OR

Discuss how rainwater harvesting in semi-arid regions of Rajasthan is carried out.

i. In semi-arid and arid regions of Rajasthan almost all the houses traditionally had underground tanks for storing drinking water.

ii. The tanks can be as large as big rooms.

iii. The tanks were part of the well-developed rooftop rainwater harvesting system.

iv. Tanks were connected to the sloping roofs of the houses through a pipe.

v. Rain falling on these rooftops would travel down the pipe and stored in these underground tanks.

vi. Usually first rain water is not collected to clean the rooftop and the pipe.

I. Long Answer Type Questions

(5 Marks each)

1. Explain any three reasons responsible for water scarcity in India

OR

Water is available in abundance in India even then scarcity of water is experienced in major parts of the country. Explain it with four examples.

2. 'Three-fourths of the earth's surface is covered with water but there is still scarcity of water across the globe.' Explain giving three reasons.

Water scarcity is due to the following causes:

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 freshwater occurs as ice sheets and glaciers, while a little less than 30 per cent is stored 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.

vii. Rising income levels also create more demand for water.

3. In recent years, multipurpose projects and large dams have come under great scrutiny and opposition. Explain why?

OR

What objections have been raised against multipurpose river valley projects.

In recent years, multipurpose projects and large dams have come under great scrutiny and opposition for a variety of reasons.

i. Regulating and damming of rivers affect their natural flow.

ii. River's diversion and barricading due to building of dams affect migration and spawning of aquatic life.

iii. The reservoirs lead to decomposition of soil and land degradation.

iv. The dams have triggered floods due to sedimentation in the reservoir and release of

excess water during heavy rains.

v. Large scale displacement of local communities, local people who give up their land for the projects hardly receive any benefit.

vi. Inter-state water disputes with regard to sharing the costs and benefits of multi-purpose projects are leading to tension between states, e.g., Kaveri Godavari dispute, Sabarmati water dispute.

4. 'Water is available in abundance in India but even then scarcity of water is experienced in major parts o the country.' Explain with four examples.

Ans.

a) Geographically, some parts of India like the desert region of Rajasthan receive low rainfall and are drought-prone. Thus, water shortage is a common and regular problem of such regions.

b) The metropolitan cities of India like Mumbai and Kolkata face acute water shortage on account of large and dense populations and their urban lifestyles requiring more water and power consumption. The multistoreyed buildings and housing complexes or colonies have their own groundwater pumping devices which lead to overexploitation and depletion causing water scarcity.

c) In the industrial areas of Uttar Pradesh, National Capital Region, Bihar etc. Water pollution due to discharge of effluents and industrial wastes and chemicals has turned big rivers like the Ganga and the Yamuna into toxic steams. Though the freshwater resources are present in sufficient quantities, it is unfit and hazardous for human use.

d) In agriculturally advanced regions of India like Punjab, Haryana and Western Uttar Pradesh, to facilitate higher foodgrain production for our growing population, water resources are being overexploited to expand irrigated areas and dry season agriculture. Overirrigation in these areas has adversely affected water availability.

5. How have intensive industrialization and urbanization passed a great pressure on existing freshwater resources in India? Explain with two examples of each.

Ans. Intensive industrialisation and urbanization in the post-independence period have exerted great pressure on the existing freshwater resources of India. The following examples further explain their effects on the fragile water resources of India.

a) Effects of industrialisation: Industries like cotton textile mills of Maharashtra, jute textile mills of Hooghly basin in West Bengal and all the iron and steel plants in the

Damodar Valley region and other parts of the country are heavy users of water and require large supply of hydroelectricity. The existing freshwater sources of these regions are overexploited as a result. Discharge of industrial effluents and dumping of industrial wastes and chemicals have turned big rivers like the Ganga and the Yamuna into toxic streams unfit and hazardous for human use. Pollution of the freshwater resources has lead to water scarcity.

b) Effects of urbanization: The metropolitan cities of India like Mumbai and Kolkata face acute water shortage on account of large and dense population and their urban lifestyles requiring more water and power consumption. Housing societies and colonies and multi-storeyed buildings in the cities have their own groundwater pumping devices which lead to overexploitation and depletion of the fragile water resources.

6. Describe any five measures adopted for conservation of water resources.

Ans. Five measures adopted for conservation of water resources are:

a) Construction of multipurpose projects and canals.
b) Solving river water disputes quickly.
c) Inter-basin transfer of water.
d) Measures to raise underground water table.
e) Rainwater harvesting and watershed development
f) Avoiding pollution of water bodies.
g) Preventing the wastage of water.

7. Multipurpose river projects are referred to as the 'temples of modern India'. Elucidate.

Ans. Multipurpose River Projects were launched after Independence with the approach of integrated water resources management. The objective was to provide multifarious benefits that would lead to the development and progress of the nation. Overcoming the hadicap of its colonial past. Jawaharlal Nehru has proudly proclaimed the present-day dams or multipurpose projects as 'temples of modern India'. The reason behind this was that these projects integrate the development of agriculture with rapid industrialization and lead to the progress of both the village and urban economy.

The benefits provided by multipurpose projects include:

a) Providing water to those areas which suffer from water scarcity.

b) Irrigation of agricultural fields during dry season as well as in regions of scanty or inadequate rainfall. This helps in increasing agricultural productivity and bringing more area under cultivation.

c) Flood control by regulating flow of water.

d) Water supply for domestic and industrial purpose.

e) Generation of hydroelectricity for our industries and homes.

f) Inland navigation for the purpose of transport and trade.

g) Fish breeding

h) Recreational facilities.

i) Soil conservation through afforestation.

As a result of these benefits that lead to all-round development of the nation, the multipurpose projects are termed as the 'temples of modern India."

8. What are inter-state water disputes? Why are such issues raised? Give examples of inter-state water disputes.

Ans. Tension created between two or more states regarding sharing of river water mainly due to construction of multipurpose projects is termed as inter-state water dispute. Inter-state water disputes arise between states regarding sharing of the costs and benefits of the multipurpose projects. When a river flows through two or more states, damming at one state may affect the follow and volume in another state. If the flow is not regulated, one state may derive multiple benefits from the river, and another state may suffer, leading to inter –state disputes. Examples of Inter-state water disputes:

a) Krishna-Godavari water dispute between Karnataka and Andhra Pradesh.

b) Kaveri water dispute between Karnataka and Tamil Nadu regarding sharing of the water of Kaveri River.

c) Narmada River water dispute involving Rajasthan, Madhya Pradesh, Gujarat, Maharashtra.

d) Ravi-Beas water dispute between Punjab and Haryana.

9. Describe the factors that are responsible for the poor condition of India's rivers both big and small rivers.

Ans. The factors responsible for the poor children of India's rivers:

a) **Small rivers:** The growing domestic, municipal, industrial and agricultural demand for water from rivers has affected the quality of water. The volume of rivers has been reduced as more and more water is being drained out of them. A heavy load of untreated sewage and

industrial effluents are emptied into the rivers This also affects the self-cleansing capacity of the rivers leading to rising pollution of their water. As a result the smaller rivers have been turned into toxic streams.

b) **Big rivers:** The big rivers have also been affected by population growth, agricultural modernisation and urbanisation. Industrialisation i.e. industries are heavy users of water and also require hydroelectric power to run them.

e.g. In Delhi large amount of domestic and industrial waste pollution. Thus big rivers like the Ganga and the Yamuna are far from being pure and efforts are being made to clean them.

II. Long Answer Type Questions (5 Marks each)

1. Why is roof top water harvesting important in Rajasthan? Explain.

Roof top 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 an extremely reliable source of drinking water when all other sources are dried up, particularly in the summers.

iii. Rain water, or Palar pani, as commonly referred to 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.

2. Why are different water harvesting systems considered a viable alternative both socioeconomically and environmentally in a country like India?

Keeping into 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 a extraordinary tradition of various water harvesting systems.

ii. People adopted different techniques in different areas. In hilly regions people built diversion channels like the 'guls' or 'kuls' for agriculture.

iii. Roof-top 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 Tanks are the forms of rain water harvesting practised in Rajasthan.

(4 Marks each)

Competency Based Questions

Case based MCQs

Atempt any 4 sub-parts from each queston. Each subpart carries 1 mark.

I. Given the abundance and renewability of water, it is difficult to imagine that we may suffer from water scarcity. The moment we speak of water shortages, we immediately associate it with regions having low rainfall of those that are drought prone. We instantaneously visualise the deserts of Rajasthan and women balancing many 'matkas' (earthen pots) used for collecting and storing water and travelling long distances to get water. True, the availability of water resources varies over space and time, mainly 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.

Where is then water scarcity likely to occur? As you have read in the hydrological cycle, freshwater can be obtained directly from precipitation, surface run off and groundwater.

Is it possible that an area or region may have ample water resources but is still facing water scarcity? Many of our cities are such examples. Thus, water scarcity may be an outcome of large and growing population and consequent greater demands for water, and unequal access to it. A large population requires more water not only for domestic use but also to produce more food. Hence, to facilitate higher food-grain production, water resources are being over-exploited to expand irrigated areas for dry-season agriculture. Irrigated agriculture is the largest consumer of water. Now it is needed to revolutionise the resistant crops and dry farming techniques. You may have seen in many television advertisements that most farmers have their own wells and tube-wells in their farms for irrigation to increase their produce. But have you ever wondered what this could result in? That it may lead to falling groundwater levels, adversely affecting water availability and food security of the people.

1. The availability of water resources varies over:

a. Space
b. Time
c. Variation in precipitation
d. All of the Above

2. Identify the cause of water scarcity.

a. Overuse of aquifers
b. Increased human consumption
c. No change in climate
d. Both A & B

3. _____ is the largest consumer of surface water.

a. Animals
b. Irrigated agriculture
c. Aqua culture
d. Industries

4. A large amount of population requires more water not only for domestic use but also t o produce more _____.

a. farms
b. Forests
c. food
d. Factories

5. Identify the drought resistance crops from the following:

a. Mushrooms
b. Bajra
c. Sweet potatoes
d. All of the Above

6. Choose the state which faced the maximum water scarcity in recent years.

a. Kerala
b. Maharashtra
c. Himachal Pradesh
d. Uttarakhand

II. Read the passage below and answer the following questions:

Given the abundance and renewability of water, it is difficult to imagine that we may suffer from water scarcity. The moment we speak of water shortages, we immediately associate it with regions having low rainfall or those that are drought prone. We instantaneously visualise the deserts of Rajasthan and women balancing many 'matkas' (earth pots) used for collecting and storing water and travelling long distance to het water.

1. How much of the earth's surface is covered with water?

a. One-half
b. Tow-third
c. Three-fourth
d. Four-fifth

2. What makes the water a renewable resource?

a. Continuous renewal and recharging of ground water through the hydrological cycle

b. The abundance of water

c. Conservation measures

d. Disturbance in the movement of water within hydrological cycle

3. Which of the following is the main cause of water scarcity?

a. Over-exploitation b. Excessive use

c. Unequal access to water among different social groups

d. All of the above

4. In which of the following regions of Rajasthan, almost all the houses traditionally had tankas for storing drinking water?

a. Bikaner b. Phalodi c. Barmer **d. All of the above**

III. Read the passage below and answer the following questions:

India's rivers, especially the smaller ones, have all turned into toxic streams. And even the big ones like the Ganga and the Yamuna are far from being pure. The assault on India's rivers-from population growth, agricultural modernisation, urbanisation and industrialisation-is enormous and growing by the day..... This entire life stands threatened.

1. Which issue has been discussed in the above passage?

a. Quality of water **b. Quantity of water**

c. Over Population d. Importance of rivers

2. Which of the following things make the river's water toxic?

a. Domestic wastes b. Industrial wastes

c. Chemicals, pesticides and fertilisers used in agriculture

d. All of the above

3. Why is it necessary to conserve and manage our precious water resources?

a. To safeguard ourselves from health hazards

b. To ensure food security

c. To prevent degradation of our natural ecosystems

d. All of the above

IV. Read the passage below and answer the following questions:

Archaeological and historical records show that from ancient times we have been constructing sophisticated hydraulic structures like dams built of stone rubble, reservoirs or lakes, embankments and canals for irrigation. Not surprisingly, we have continued this tradition in modern India by building dams in most of our river basins.

1. Which one of the following is not the benefit of dams?

a. Electricity generation

b. Water supply for domestic and industrial uses,

c. Flood control

d. Large-scale displacement of local communities

2. Which dam in the Mahanadi basin integrates conservation of water with flood control?

a. Hirakud dam b. Bhakra-Nangal dam

c. Sardar Sarovar Dam d. Tehri dam

3. Who did proudly proclaim the dams as the 'temples of modern India'?

a. Mahatma Gandhi **b. Jawaharlal Nehru**

c. Sardar Vallabhai Patel d. Indira Gandhi

4. Which one of the following statements regarding dams is incorrect?

a. A dam is a barrier across flowing water that obstructs, directs or retards the flow, often creating a reservoir, lake or impoundment.

b. 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.

c. Dam refers to the structure rather than the reservoir.

d. Dams are classified according to structure, intended purpose or height.

5. In which of the following places the ancient hydraulic structures are found?

a. Sringaverapura b. Hauz Khas, Delhi

c. Kaling , Odisha **d. All of the above**

V. Read the passage below and answer the following questions:

Multi-purpose projects, launched after Independence with their integrated water resources management approach, were thought of as the vehicle that would lead the nation to development and progress, overcoming the handicap of its colonial past. Jawaharlal Nehru proudly proclaimed the dams as the 'temples of modern India'; the reason being that it would integrate development of agriculture and the village economy with rapid industrialisation and growth of the urban economy.

i) What are dams?

ii) How do dams help in conserving and managing water?

iii) Why did Jawaharlal Nehru proclaim dams as 'temples of modern India'?

Ans.

i. A dam is a barrier across flowing water that obstructs, directs or retards the flow, often creating a reservoir, lake. 'Dam' refers to the reservoir rather than the structure.
   - Dams were traditionally built to impound rivers and rain water that could be used later to irrigate agriculture fields.

ii. 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 projects water is being used both for hydel power production and irrigation.

iii. Jawaharlal Nehru proclaimed dams as 'temples of modern India' because it would integrate development of agriculture and the village economy with rapid industrialisation and growth of the urban economy.

Case based Subjective Questions

II. Read the extract given below and answer any five out six the questions:

In the semi-arid and arid regions of Rajasthan, particularly in Bikaner, Phalodi and Barmer, almost all the houses traditionally had underground tanks or tankas for storing drinking water. The tanks could be as large as a big room; one household in Phalodi had a tank that was 6.1 metres deep, 4.27 metres long and 2.44 metres wide. The tankas were part of the well-developed rooftop rainwater harvesting system and were built inside the main house or the courtyard. They were connected to the sloping roofs of the houses through a pipe. Rain falling on the rooftops would travel down the pipe and was stored in these underground 'tankas'. The first spell of rain was usually not collected as this would clean the roofs and the pipes. The rainwater from the subsequent showers was then collected. The rainwater can be stored the tankas till the next rainfall making it an extremely reliable source of drinking water when all other sources are dried up, particularly in the summers. Rainwater, or palar pain, as commonly referred to in these parts, is considered the purest form of

natural water. Many houses constructed underground rooms adjoining the 'tanka' to beat the summer heat as it would keep the room cool.

1. Name a traditional rainwater harvesting technique, commonly practiced in Rajasthan, India.

A tanka is a traditional rainwater harvesting technique, common to the Thar desert region of Rajasthan, India.

2. In which part of Rajasthan are tankas commonly used?

In the semi-arid and arid regions of Rajasthan, particularly in Bikaner, Phalodi and Barmer, almost all the houses, traditionally, have big underground tanks called 'tankas' for storing drinking water.

3. What are palarpani?

Rainwater is referred to as palarpani in Rajasthan. It is considered as the purest form of natural water.

4. State any one benefit of constructing a tanka.

i. Tankas provide reliable source of drinking water during summer when other sources dry up.

ii. It helps in keeping the room cool.

5. What is rooftop rainwater harvesting?

Rooftop Rain Water Harvesting is the technique through which rain water is captured from the roof catchments and stored in reservoirs.

6. State any two advantages of rooftop rainwater harvesting.

i. It reduces the cost of pumping groundwater.

ii. Provides high-quality water that is soft and low in minerals.

iii. Reduces soil erosion in urban and rural areas.