

Q: Consider the following statement regarding the recent released ground water report:

1. Delhi and Haryana have high groundwater abstraction rates.
2. The average storage decline in Uttar Pradesh, Bihar and West Bengal.
3. Rajasthan is showing no improvement in ground water level.

Choose the correct option from the codes given below:

- a) 1 and 2
- b) 2 and 3
- c) 1 and 3
- d) 1, 2 and 3

Ans: a

Explanation:

- Groundwater storage levels have been declining by 2.6 centimetres per year in the Ganga basin, according to new estimates.
- The impacts were more pronounced in Rajasthan, Haryana and Delhi, with average storage declines of roughly 14 cm year⁻¹, 7.5 cm year⁻¹ and 7.2 cm year⁻¹, respectively.
- The average storage decline in Uttar Pradesh, Bihar and West Bengal was estimated to be roughly 2cm year⁻¹, 1 cm year⁻¹ and 0.6 cm year⁻¹, respectively.
- Delhi and Haryana have high groundwater abstraction rates, which explains the steep decline.
- Rajasthan, whose groundwater reserves contribute about 90 per cent of the drinking water and 60 per cent of the irrigation, is showing an improvement in groundwater levels in the recent past.
- A recent Central Groundwater Board yearbook, which monitors groundwater levels four times a year, found that the water levels in 2021-2022 rose compared to the 2011-2020 average, barring the pre-monsoon period.

Q: Consider the following statement regarding Muons:

1. They are highly stable sub-atomic particles and exist for just 2.2 microseconds.
2. They are subatomic particles raining from space.
3. These particles resemble electrons but are 207 times as massive.

Choose the correct option from the codes given below:

- a) 1 and 2
- b) 2 and 3
- c) 1 and 3
- d) 1, 2 and 3

Ans: b

Explanation:

- Muons are subatomic particles raining from space. They are created when the particles in Earth's atmosphere collide with cosmic rays, clusters of high-energy particles that move through space at just below the speed of light.
- These particles resemble electrons but are 207 times as massive. Therefore, they are sometimes called "fat electrons".
- Because muons are so heavy, they can travel through hundreds of metres of rock or other matter before getting absorbed or decaying into electrons and neutrinos. In comparison, electrons can penetrate through only a few centimetres. Muons are highly unstable and exist for just 2.2 microseconds.

Q: Consider the following statement:

1. The Sixth Schedule of India's Constitution protects tribal populations.
2. Currently, ten Autonomous Development Councils exist in the tribal areas.

Choose the correct option from the codes given below:

- a) 1 Only
- b) 2 Only
- c) 1 and 2
- d) None of the above.

Ans: c

Explanation:

- The Sixth Schedule of India's Constitution protects tribal populations and provides autonomy to communities to frame laws on land, public health, agriculture, etc.
- Currently, ten Autonomous Development Councils exist in the tribal areas of Assam, Meghalaya, Tripura, and Mizoram.
- Ladakh was previously protected under Article 370, but the Indian government's revocation of Jammu and Kashmir's special status removed the provisions for Ladakh as well. Ladakh became a Union Territory.

Q: Consider the following statement regarding the melting of glacial in Ladakh:

1. Lose potable water
2. Agriculture practices threatened
3. Impact the biodiversity of the area

Choose the correct option from the codes given below:

- a) 1 and 2
- b) 2 and 3
- c) 1 and 3
- d) 1, 2 and 3

Ans: d

Explanation:

- Ladakh is a cold desert and extremely sensitive to climate change. People of the region depend on glaciers to fulfil their water needs.
- The melting of glaciers has three effects on the lives of Ladakh's people: they lose potable water; agriculture practices specific to the region are threatened; and sustainable practices that support life in the region, like surviving on a minimal quantity of water, are slowly eroded.
- Loss of sustainable practices due to scarcity of water may also affect the livelihoods of locals and their cultural heritage, and force them to migrate.
- A change in the ecological balance of Ladakh will also impact the biodiversity of the area. The flora and fauna of Ladakh are highly evolved to survive in harsh climatic conditions and will be threatened due to changes in the local ecosystems.

Q: Consider the following statement regarding Muography:

1. It is used by researchers to analyse Mount Vesuvius.
2. Scientists used the technique to look inside the Fukushima nuclear reactors after the 2011 earthquake and tsunami in Japan.
3. It has been used in customs security, internal imaging of volcanoes and others.

Choose the correct option from the codes given below:

- a) 1 and 2
- b) 2 and 3
- c) 1 and 3
- d) 1, 2 and 3

Ans: d

Explanation:

- Apart from archaeology, muography has found use in customs security, internal imaging of volcanoes and others.
- Around 2015, scientists used the technique to look inside the Fukushima nuclear reactors after the 2011 earthquake and tsunami in Japan. As the site was highly radioactive, they put the two muon detectors in 10 centimetres thick boxes to protect them from radiation and then carried out the scanning.
- Muography is also being used by researchers to analyse Mount Vesuvius, a volcano in Italy.