

Q: Consider the following statement regarding E prime layer:

1. It is a layer where material exchange between the core and mantle takes place.
2. This reaction leads to the formation of a hydrogen-rich, silicon-depleted layer at the outer core.
3. These modifications in the liquid metallic layer could potentially result in increased density.

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:

- E prime layer was believed that a material exchange between the core and mantle is small.
- But the experiments revealed that when water reaches the core-mantle boundary, it reacts with silicon in the core, forming silica.
- This latest research suggests that tectonic plates carrying surface water have transported it deep into the Earth over billions of years.
- Upon reaching the core-mantle boundary about 1,800 miles below the surface, this water initiates significant chemical changes, influencing the core's structure.
- Scientists have observed that subducted water reacts chemically with core materials under high pressure.
- This reaction leads to the formation of a hydrogen-rich, silicon-depleted layer at the outer core, resembling a film-like structure.
- Silica crystals generated by this process ascend and blend into the mantle, impacting the overall composition.
- These modifications in the liquid metallic layer could potentially result in reduced density and altered seismic characteristics, aligning with anomalies detected by seismologists.

Q: Consider the following statement regarding Technology Development Board:

1. It is a non-statutory body.
2. It aims to promote the development and commercialization of indigenous technology.
3. It provides equity capital or loans to industrial concerns and financial assistance to research and development institutions.

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:

- Technology Development Board is a statutory body constituted under the Technology Development Board Act, 1995.
- It aims to promote the development and commercialization of indigenous technology and the adaptation of imported technology for wider application.
- The board consists of 11 Board members.
- It provides equity capital or loans to industrial concerns and financial assistance to research and development institutions.
- The Fund has been receiving grants from the Government of India out of the cess collections from the industrial concerns under the provisions of the Research and Development Cess Act, 1986, as amended in 1995.

Q: Consider the following statement regarding Nitrogen-9 nucleus:

1. This disparity has a critical effect on the isotope's stability.

2. Most nitrogen comes as the isotope nitrogen-14, with seven protons and seven neutrons.

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:

- Nitrogen-9 nucleus is characterised by seven protons and two neutrons – which is an unusually high proton-to-neutron ratio.
- This disparity has a critical effect on the isotope's stability, influencing its decay processes as well as overall behaviour.
- For one, the high proton content places nitrogen-9 atoms beyond the conventional stability thresholds.
- Most nitrogen comes as the isotope nitrogen-14, with seven protons and seven neutrons. But physicists say they have glimpsed a far more elusive variant with just two neutrons.

Q: Consider the following statement regarding Anticipatory Bail:

- 1. It is the bail granted to a person in anticipation and apprehending arrest.
- 2. Under Section 438 of CrPC, any individual who discerns that he may be tried for a non-bailable offence can apply for anticipatory bail.
- 3. Anticipatory Bail is bail before the arrest.

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:

- Anticipatory Bail is the bail granted to a person in anticipation and apprehending arrest.
- Under Section 438 of CrPC, any individual who discerns that he may be tried for a non-bailable offence can apply for anticipatory bail.
- The application shall be made to the High Court or Sessions Court, where the crime is alleged to be committed.
- Anticipatory Bail is bail before the arrest, and the police can't arrest an individual if the Court has granted anticipatory Bail.
- It is meant to be a safeguard for a person who has false accusations or charges made against him/her, most commonly due to professional or personal enmity, as it ensures the release of the falsely accused person even before he/she is arrested.

Q: Consider the following statement regarding Narmada River:

- 1. The origin of the river is on the Amarkantak Hill.
- 2. The river flows through Madhya Pradesh, Maharashtra, and Gujarat.
- 3. It is the largest east-flowing river in peninsular India.

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:

- Narmada River is the largest west-flowing river in peninsular India.
- The origin of the river is a tiny reservoir named Narmada Kund, which is situated on the Amarkantak Hill in the Anuppur District of East Madhya Pradesh at an elevation of 1,057 m (3,467.8 ft).
- The river flows through Madhya Pradesh, Maharashtra, and Gujarat between Vindhya and Satpura hill ranges before falling into the Gulf of Cambay in the Arabian Sea about 10 km north of Bharuch, Gujarat.
- Length: The total length of the river from source to sea is 1312 kilometres (815 miles).
- It is one of the rivers that flow in a rift valley and acts as a divider between North India and South India.
- The river has numerous waterfalls, notably the Dhuandhar Falls, southwest of Jabalpur.