

Q: Consider the following statement:

1. GaN nanostructures is a widely used material for blue light emission.
2. Surface polaritons are special modes of electromagnetic waves traveling at the interface of a conductor.
3. Polaritons are quasi-particles, which have only light characteristics.

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:

- GaN, a widely used material for blue light emission, is one of the most advanced semiconductors. Though visible and ultraviolet light applications of GaN have already been realized, with LEDs and laser diodes commercially available, utilization of GaN for IR light harvesting or development of GaN-based IR optical elements is lacking.
- Surface polaritons are special modes of electromagnetic waves traveling at the interface of a conductor and an insulator such as air.
- By altering the morphology and shape of the nanostructures, they are also able to excite plasmon polaritons in GaN, which results in extending the light-matter coupling to further reaches of the electromagnetic spectrum. These polaritons are quasi-particles, which have both light and matter characteristics.

Q: Consider the following statement regarding the “Khurda Model of redevelopment”:

1. Khurda station in West Bengal.
2. The scheme's target is the introduction of new amenities as well as to upgrade and replace existing facilities.

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: b

Explanation:

- The scheme's target is the introduction of new amenities as well as to upgrade and replace existing facilities.
- These stations will be redeveloped under what is being internally called the "Khurda model of redevelopment".
- Khurda station in Odisha was modernised for Rs 4 crore with all contemporary amenities for passengers. The main structure was renovated, the facade was redone and the number of railway tracks was also increased.

Q: Consider the following statement:

1. “Cryomesh” is the technology used to preserve corals.
2. This technology was first used to preserve larger varieties of the Hawaiian corals.

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:

- Cryogenically frozen coral can be stored and later reintroduced to the wild but the current process requires sophisticated equipment including lasers. Scientists say a new lightweight “cryomesh” can be manufactured cheaply and better preserves coral.

- In a December lab trial, the world's first with Great Barrier Reef coral, scientists used the cryomesh to freeze coral larvae at the Australian Institute of Marine Sciences (AIMS).
- The coral had been collected from the reef for the trial, which coincided with the brief annual spawning window.
- The cryomesh was previously trialled on smaller and larger varieties of the Hawaiian corals.

Q: Consider the following statement:

1. Mesh Technology help to preserve coral larvae.
2. Bleaching happens when corals experience stress in their environment.
3. Under stressed conditions, the zooxanthellae inside coral polyps start producing reactive oxygen species, which are not beneficial to the corals.

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:

- The mesh technology, which will help store coral larvae at -196°C (-320.8°F), was devised.
- It was first tested on corals.
- Bleaching happens when corals experience stress in their environment due to changes in temperature, pollution or high levels of ocean acidity.
- Under stressed conditions, the zooxanthellae or food-producing algae living inside coral polyps start producing reactive oxygen species, which are not beneficial to the corals.

Q: Consider the following statement regarding Great Barrier Reef:

- a) It was selected as a World Heritage Site in 1981.
- b) It is the world's most extensive and spectacular coral reef ecosystem.
- c) It is located in the North-East Coast of New Zealand.

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:

- The Great barrier reef is located in the Coral Sea (North-East Coast), off the coast of Queensland, Australia.
- It is the world's most extensive and spectacular coral reef ecosystem composed of over 2,900 individual reefs and 900 islands.
- It was selected as a World Heritage Site in 1981.