

## UPSC Prelims 2020

### Science & Technology

1. In the context of recent advances in human reproductive technology, "Pronuclear Transfer" is used for
  - (a) fertilization of egg in vitro by the donor sperm
  - (b) genetic modification of sperm producing cells
  - (c) development of stem cells into functional embryos
  - (d) prevention of mitochondrial diseases in offspring

Answer-A

Explanation: [https://www.sciencedirect.com/science/article/pii/S2212066116300345#:~:text=Pronuclear%20transfer%20\(Fig.,the%20intending%20male%20parent%20sperm.](https://www.sciencedirect.com/science/article/pii/S2212066116300345#:~:text=Pronuclear%20transfer%20(Fig.,the%20intending%20male%20parent%20sperm.)

2. With the present state of development, Artificial Intelligence can effectively do which of the following?
  1. Bring down electricity consumption in industrial units
  2. Create meaningful short stories and songs
  3. Disease diagnosis
  4. Text-to-Speech Conversion
  5. Wireless transmission of electrical energy

Select the correct answer using the code given below:

- (a) 1,2,3 and 5 only
- (b) 1,3 and 4 only
- (c) 2,4 and 5 only
- (d) 1,2,3,4 and 5

Answer: D

3. With reference to Visible Light Communication (VLC) technology, which of the following statements are correct?

1. VLC uses electromagnetic spectrum wavelengths 375 to 780 nm.
2. VLC is known as long-range optical wireless communication
3. VLC can transmit large amounts of data faster than Bluetooth
4. VLC has no electromagnetic interference

Select the correct answer using the code given below:

- (a) 1, 2 and 3 only
- (b) 1, 2 and 4 only
- (c) 1, 3 and 4 only
- (d) 2, 3 and 4 only

Answer: C

Explanation: **visible light communication” By Shlomi Arnon**

**Visible light communication (VLC) has become an alternative candidate in next-generation indoor wireless local area network. Hence Statement 2 is wrong**

**speed of bluetooth file transfer is 3-25 Mbps However Speed of VLC is 1.6Gbps**

<https://www.sciencedirect.com/science/article/pii/S2405959515000053>

4. With reference to “Blockchain Technology”, consider the following statements:

1. It is a public ledger that everyone can inspect, but which no single user controls.
2. The structure and design of blockchain is such that all the data in it are about cryptocurrency only
3. Applications that depend on basic features of blockchain can be developed without anybody's permission

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 1 and 2 only

(c) 2 only

(d) 1 and 3 only

Answer: D

Explanation: **Blockchain technology can be integrated into multiple areas. Cryptocurrencies, Smart contracts, Financial services, Video games, Energy trading, Supply chain, Domain Names, compiling data on sales, tracking digital use and payments to content creators, such as wireless users or musicians. Hence Statement 2 is wrong**

5. With reference to carbon nanotubes, consider the following statements:

1. They can be used as carriers of drugs and antigens in the human body.
2. They can be made into artificial blood capillaries for an injured part of human body.
3. They can be used in biochemical sensors.
4. Carbon nanotubes are biodegradable

Which of the statements given above are correct?

- (a) 1 and 2 only
- (b) 2, 3 and 4 only
- (c) 1, 3 and 4 only
- (d) 1, 2, 3 and 4

Answer: D

Explanation: **NASA, Wikipedia**

6. Consider the following activities:

1. Spraying pesticides on a crop field
2. Inspecting the craters of active volcanoes.
3. Collecting breath samples from spouting whales for DNA analysis

At the present level of technology, which of the above activities can be successfully carried out by using drones?

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

Answer:D

**Explanation: Drones can be used to collect Whale SNOT.**

**From the SNOT, DNA and hormones can be taken for analysis**

**Source: NCERT, National Geographic**

**7. "The experiment will employ a trio of spacecraft flying in formation in the shape of an equilateral triangle that has sides one million kilometres long, with lasers shining between the craft." The experiment in question refers to**

- (a) Voyager-2
- (b) New Horizons
- (c) LISA Pathfinder
- (d) Evolved LISA

Answer: C

**Explanation: Source: NASA website, European Space agency (ESA) website**

**LISA Pathfinder is used for gravitational wave detection. LISA Pathfinder is an ESA mission, which also carries a NASA payload.**

8. Consider the following statements:

1. Genetic changes can be introduced in the cells that produce eggs or sperms of a prospective parent.
  2. A person's genome can be edited before birth at the early embryonic stage.
  3. Human induced pluripotent stem cells can be injected into the embryo of a pig.
- Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 and 3 only
- (c) 2 only

(d) 1,2 and 3

Answer: D

Explanation: **Concepts, Wikipedia**

9.What is the importance of using Pneumococcal Conjugate Vaccines in India?

1. These vaccines are effective against pneumonia as well as meningitis and sepsis.
  2. Dependence on antibiotics that are not effective against drug – resistant bacteria can be reduced.
  3. These vaccines have no side effects and cause no allergic reactions.
- Select the correct answer using the code given below:

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

Answer: B

**Source: National Center for Biotechnology Information (NCBI), World Health Organisation (WHO)**

**Explanation: Pneumococcal vaccines are effective against Pneumonia, Meningitis and Sepsis. They reduce dependence on Antibiotics that are not effective against Drug resistant bacteria. These vaccines can cause side effects/allergies.**

10.Which of the following statements are correct regarding the general difference between plant and animal cells?

1. Plant cells have cellulose cell walls whilst animal cells do not.
2. Plant cells do not have plasma membrane unlike animal cells which do.
3. Mature plant cell has one large vacuole whilst animal cell has many small vacuoles.

Select the correct answer using the code given below:

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

Answer: C

**Source: NCERT**

**Explanation: Both Plant cells and animal cells have plasma/cell membrane. Animal cells don't have cell walls unlike plants. Plant cells have one large vacuole while animal cells have many smaller vacuoles.**

11. In India, the term "Public Key Infrastructure" is used in the context of

- (a) Digital security infrastructure
- (b) Food security infrastructure
- (c) Health care and education infrastructure
- (d) Telecommunication and transportation infrastructure

Answer: A

**Source: Wikipedia**

