

# Science and Technology

## Questions and Solutions 2020

Q 1. 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 membranes unlike animal cells which do.
- (3) Mature plant cell has one large vacuole whilst an 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

Q 2. 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

Q 3. 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

Q 4. With reference to the carbon nanotubes, consider the following statement :

- (1) They can be used as the carriers of drugs and antigens in the human body.
- (2) They can be made into artificial blood capillaries for an injured part of the 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

Q 5. 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

Q 6. 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

Q 7. With reference to visible light communication (VLC) technology, which of the following statements are correct?

- (1) VLC uses electromagnetic spectrum wavelengths 375 to 780nm
- (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

Q 9. 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

Q 10. 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

Q 11. 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

Q 12. With reference to solar water pumps, consider the following statements:

(1) Solar power can be used for running surface pumps and not for submersible pumps,

(2) Solar power can be used for running centrifugal pumps and not the ones with piston.

Which of the statements given above is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

Solutions of Science & Technology Questions in UPSC Prelims 2020

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| 1. C  | 7. C  |
| 2. D  | 8. A  |
| 3. B  | 9. D  |
| 4. C* | 10. D |
| 5. D  | 11. D |
| 6. D  | 12. D |

