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Daily MCQs: 07/03/2023

1. The 'Sendai Framework', frequently seen in the news, is related to

- A. Fundamental principles of cybersecurity
- B. Protection of the Arctic environment and sustainable development
- C. Disaster Risk Reduction
- D. Commercial whaling

2. Consider the following statements.

- 1. Gene editing is a group of technologies that give scientists the ability to change an organism's DNA.
- 2. CRISPR-Cas9 technology replicates a natural defence mechanism in some bacteria that uses a similar method to protect itself from virus attacks.

Which of the above statements is/are correct?

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. Neither 1 nor 2

3. Which of the following straits connect the Aegean sea and Sea of marmara?

- A. Strait of Gibraltar
- B. Straits of Dardanelles
- C. Strait of Kerch
- D. Strait of Hormuz

4. Consider the following statements about Eklavya Model Residential Schools (EMRSs).

- 1. These schools are being set up by the Ministry of Tribal Affairs.
- 2. At least 75% seats are reserved for rural children.

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

5. Consider the following statements about Compressed Bio-Gas (CBG) and Compressed Natural Gas (CNG).

- 1. Chemically, both CBG and CNG are primarily compressed carbon monoxide.
- 2. While CNG is a by-product of petroleum, CBG can be produced from any biomass.

Which of the statements given above is/are correct?

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- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. Neither 1 nor 2

Solutions:

1. Answer: C

Sol:

- The Sendai Framework is a **15-year, voluntary, non-binding agreement** which recognizes that the State has the primary role to reduce disaster risk, but that responsibility should be shared with other stakeholders including local governments, the private sector, the scientific community and NGOs.
- It lists **priority areas for action** such as:
 - understanding disaster risk,
 - strengthening disaster risk governance to manage disaster risk,
 - investing in disaster risk reduction for resilience and
 - enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction.
- It aims to achieve the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries over the next 15 years (2015-2030).
- The Framework was adopted at the **Third UN World Conference on Disaster Risk Reduction** in Sendai, Japan, on **March 18, 2015**.

NDMP of India

- The National Disaster Management Plan (NDMP) of India provides a framework and direction to the government agencies for all phases of the disaster management cycle. The plan is prepared by the National Disaster Management Authority.
- The NDMP has been aligned broadly with the goals and priorities set out in the Sendai Framework for Disaster Risk Reduction. For each hazard, the approach used in this national plan incorporates the four priorities enunciated in the Sendai Framework into the planning framework for Disaster Risk Reduction under the five Thematic Areas for Actions:
 - Understanding Risk
 - Inter-Agency Coordination
 - Investing in DRR – Structural Measures
 - Investing in DRR – Non-Structural Measures
 - Capacity Development

2. Answer: C

Sol:

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- **Statement 1 is correct:** Gene editing (also known as genome editing) is a group of technologies that give scientists the **ability to change an organism's DNA**. These technologies allow genetic material to be added, removed, or altered at particular locations in the **genome**.
 - *A genome is the complete set of genetic information in an organism. It provides all of the information the organism requires to function. In living organisms, the genome is stored in long molecules of DNA called chromosomes.*
- Genome editing is of great interest in the **prevention and treatment of human diseases**. Currently, most research on genome editing is done to understand diseases using cells and animal models.
- Gene editing is being explored in research on a wide variety of diseases, including single-gene disorders such as cystic fibrosis, haemophilia, and sickle cell disease. It also holds promise for the treatment and prevention of more complex diseases, such as cancer, heart disease, mental illness, and human immunodeficiency virus (HIV) infection.

CRISPR-Cas9

- Several approaches to genome editing have been developed. A recent one is known as CRISPR-Cas9, which is short for clustered regularly interspaced short palindromic repeats and CRISPR-associated protein 9.
- This method of genome editing is **faster, cheaper, more accurate, and more efficient** than other existing methods.
- In essence, the technology works in a simple way — it locates the specific area in the genetic sequence which has been diagnosed to be the cause of the problem, cuts it out, and replaces it with a new and correct sequence that no longer causes the problem.
- **Statement 2 is correct:** The technology **replicates a natural defence mechanism in some bacteria** that uses a similar method to protect itself from virus attacks.

How does it work?

- An **RNA molecule** is programmed to locate the particular problematic sequence on the DNA strand, and a special protein called **Cas9**, which now is often described in popular literature as '**genetic scissor**', is used to break and remove the problematic sequence.
- A DNA strand, when broken, has a natural tendency to repair itself. But the auto-repair mechanism can lead to the re-growth of a problematic sequence. Scientists intervene during this auto-repair process by supplying the desired sequence of genetic codes, which replaces the original sequence.
- It is like cutting a portion of a long zipper somewhere in between, and replacing that portion with a fresh segment.

Concerns

- **Unwanted mutations:** The application of CRISPR-Cas9 in the germline is considered more problematic because of the risk of causing various mutations and side effects and transferring undesirable changes to future generations.
- **Human clinical trials** have not been carried out anywhere in the world to test whether disabling genes completely prevents diseases and what the side-effects of doing so would be.
- **Unethical practices:** The concept of designer babies may start. A Chinese doctor in 2018 claimed to use CRISPR-Cas9 technology to alter the genes of a human embryo that eventually resulted in the birth of twins.

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- Following a global outcry, the **World Health Organization (WHO)** formed a panel of gene-editing experts which called upon WHO to set up a **central registry** of all human genome editing research to create an open and transparent database of ongoing work.
- The idea of a classless society may not exist in the future as some may claim **genetic superiority** like the Aryan Theory of Hitler.

3. Answer: B

Sol:



- The Straits of Dardanelles connects **Aegean sea** and **Sea of marmara**
- The Strait of Gibraltar connects the **Atlantic ocean** and **Mediterranean sea**.
- The Strait of Kerch connects **Black Sea** and the **Azov sea**.
- The Strait of Hormuz connects **Persian Gulf and Gulf of Oman**.

4. Answer: A

Sol:

- The scheme of Eklavya Model Residential Schools (EMRSs) was introduced in the year 1997-98 with an objective to provide quality middle and high-level education to **Scheduled Tribe (ST) students in remote areas** in order to enable them to avail of reservation in high and professional educational courses and get jobs in government and public and private sectors.
- The schools focus not only on academic education but on the all-round development of the students. Each school has a capacity of 480 students, catering to students from **Class VI to XII**.
- It has been decided that by the year 2022, **every block with more than 50% ST population and at least 20,000 tribal persons**, will have an EMRS.
- EMRS are set up in States/UTs with grants under **Article 275(1)** of the Constitution of India.
- **Statement 1 is correct:** The scheme is being implemented by the **Ministry of Tribal Affairs**.

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- **Statement 2 is incorrect:** No such criteria is fixed by the government.

5. Answer: B

Sol:

About CNG

- Bio-gas is produced naturally through a process of **anaerobic decomposition** from waste / bio-mass sources like agriculture residue, cattle dung, sugarcane press mud, municipal solid waste, sewage treatment plant waste, etc. After purification, it is compressed and called CBG, which has **pure methane content of over 95%**.
- Compressed Bio-Gas can be produced from various bio-mass/waste sources, including agricultural residue, municipal solid waste, sugarcane press mud, distillery spent wash, cattle dung and sewage treatment plant waste.
- The other waste streams, i.e, rotten potatoes from cold storages, rotten vegetables, dairy plants, chicken/poultry litter, food waste, horticulture waste, forestry residues and treated organic waste from industrial effluent treatment plants (ETPs) can be used to generate biogas.

What is Compressed Natural Gas (CNG)?

- CNG is a **natural gas under pressure** which remains **clear, odourless, and non-corrosive**. It is also a cheaper, greener, and more efficient alternative to the traditional petrol and diesel fuels for vehicles.
- CNG is comprised of **methane gas** which, like gasoline, produces engine power when mixed with air and fed into an engine's combustion chamber. When CNG reaches the combustion chamber, it mixes with air, is ignited by a spark and the energy from the explosion moves the vehicle.

CBG Vs CNG

Similarities

- **Statement 1 is incorrect:** Chemically, Both CBG and CNG are **compressed methane**.
- Also, both have the same calorific value.

Difference

- **Statement 2 is correct:** While CNG is a **by-product of petroleum**, CBG can be produced from **any biomass**, be it crop residue, cattle dung, sugarcane press mud, municipal wet waste or effluents from a sewage treatment plant.

Significance of CBG

- CBG serves as a **commercially viable option** as it can be directly used to replace CNG in transportation fuel.
- Like CNG, CBG too can be transported through cylinders or pipelines to retail outlets.
- The **abundance of biomass** in the country reiterates that CBG has the potential to replace CNG in automotive, industrial and commercial uses.
- Its **solid by-products can be used as bio-manure**.

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- Estimates under SATAT show the 5,000 planned CBG plants will generate 50 million tonnes of bio-manure a year.
- According to the Punjab Agricultural University, **bio-manure** produced using paddy straw can result in a 20 per cent increase in crop yield. Bio-manure produced from paddy straw also has a **high water retention capacity** that helps reduce irrigation requirement.
- The **other by-product is CO₂**. It can be tapped while purifying the biogas and used to produce liquid or solid CO₂, which have **high demand for food preservation** or to be used in **fire extinguishers**.

