

# CSB IAS ACADEMY

THE ROAD MAP TO MUSSORRIE...

PRELIMS EDGE – 2025 – 17/11/2024

## FUEL CELL ELECTRIC VEHICLE (FCEV)

**Context:** After Hybrid and Electric Vehicles, Hydrogen based vehicles are getting traction in India



### Hydrogen fuel cell

- The hydrogen fuel cell uses **hydrogen and air to generate electricity**, producing only heat and water in the process.
- Fuel cells work in a similar manner to conventional batteries found in electric vehicles but they do not run out of charge and do not need to be recharged with electricity.
- It continues to produce electricity if there is a supply of hydrogen. Just like conventional cells, a fuel cell consists of an **anode** (negative electrode) and **cathode** (positive electrode) sandwiched around an electrolyte.
- Hydrogen is fed to the anode and air is fed to the cathode.
- The electrons go through an external circuit, creating a flow of electricity

that can be used to power electric motors.

- The protons, on the other hand, move to the cathode through the electrolyte.
- Once there, they unite with oxygen and electrons to produce water and heat.

### What is the advantage of hydrogen FCEV?

- The main advantage of hydrogen fuel cell electric vehicles (FCEV) is that they produce **no tailpipe emissions**.
- They are **more efficient** than internal combustion engine vehicles.
- When it comes to **refuelling time**, which makes them **more practical** than battery-powered electric vehicles for public transportation purposes.

### What are the challenges with FCEVs?

- FCEVs do not generate gases that contribute to global warming; the process of making hydrogen needs energy — often from fossil fuel sources. This has raised questions over hydrogen's green credentials.
- There are questions of safety — hydrogen is **more explosive** than petrol.
- Hydrogen fuel tanks in FCEVs such as the **Toyota Mirai** are made from highly durable carbon fibre, whose strength is assessed in crash tests, and trials where bullets are fired at it, which makes vehicles, more

**expensive, and fuel dispensing pumps are scarce.**

*Source: Omega Seiki to unveil hydrogen-powered three wheelers (The Hindu)*

## TERMS IN NEWS

### AI-enabled e-Tarang System

- It is a unique software, developed in collaboration with **Bhaskaracharya National Institute for Space Applications and Geo-informatics (BISAG-N)**.
- It is an advanced AI-powered platform designed to **optimize communication and enhance electronic warfare capabilities**.
- It will improve planning for **interference-free operation of defense equipment** during both wartime and peacetime.
- It will enable **automated, efficient planning and management of Defence Spectrum**, as well as support development of newer technologies in higher frequency bands.
- It is set to support rapid decision-making, thereby allowing seamless integration of newer technologies critical for modern defense applications.

### Key facts about the BISAG-N :

- It is an Autonomous Scientific Society of the Ministry of Electronics & Information Technology (MeitY), Government of India.
- It undertakes technology development & management, research & development, facilitates National & International cooperation,

capacity building and support technology transfer & entrepreneurship development in area of geo-spatial technology.

- The Organization has three main domain areas: **Satellite Communication, Geo-informatics and Geo-spatial technology.**

### Avian Botulism

- It is caused by the ingestion of a toxin produced by the **bacterium Clostridium botulinum, which leads to paralysis and can be fatal for birds.**
- These **bacterial spores** are widespread in wetland sediments and are found in most wetland habitats, including invertebrates such as insects, molluscs, and crustaceans, as well as in many vertebrates, including healthy birds.
- There are seven types of botulism toxins (A-G). Wild birds are affected by type C and type E.
- Environmental conditions thought to contribute to toxin production include high water temperatures and low oxygen levels in the water.

### Key facts about Sambar Lake :

- It is the largest saltwater lake in India.
- It is located in the districts of Nagaur and Jaipur in Rajasthan.
- It covers an area in excess of 200 sq.km., surrounded on all sides by the Aravalli hills.
- The water from two major ephemeral streams, namely Mendha and Runpangarh, along with numerous rivulets and surface runoff feed the lake.

- It was designated as a **Ramsar site** in the year 1990.
- Several migrating birds visit the waterbody during the winter.



### Exercise 'Poorvi Prahar'



- The Indian Army is conducting a high-intensity tri-service exercise, 'Poorvi Prahar', in the forward areas of Arunachal Pradesh
- It aims to hone the combat effectiveness of the Army, Navy, and Air Force in executing Integrated Joint Operations in the challenging mountainous terrain of the region, enhancing inter-service coordination and operational readiness.
- It brings together a wide spectrum of cutting-edge military platforms and systems, showcasing India's advancements in modern warfare technology.
- A key feature of this exercise is the integration of innovative technologies that are reshaping the future of military operations.
- Troops are operating and refining skills with Swarm Drones, First Person View (FPV) Drones, and Loitering Munitions, cutting-edge technologies that dramatically enhance situational awareness, precision strikes, and operational flexibility.
- The incorporation of these tools into the exercise reflects the military's commitment to leveraging next-generation technologies to bolster defense capabilities.
- It serves as a platform for further absorption and integration of advanced technological tools and joint command structures that improve collaboration across services.
- One of the core components of the exercise is the development of a Common Operating Picture (COP) through joint control structures that optimise coordination between ground, air, and naval forces.
- Real-time information is seamlessly shared through systems operating on satellite communications, powered by AI-driven analytics, enabling more precise decision-making and faster response times.

### Methamphetamine



- Methamphetamine, commonly referred to as meth, is a powerful, highly **addictive stimulant that affects the central nervous system.**
- It takes the form of a **white, odorless, bitter-tasting crystalline powder** that easily dissolves in water or alcohol.
- It was developed early in the 20th century from its parent drug, **amphetamine**, and was used originally in nasal decongestants and bronchial inhalers.
- Like amphetamine, methamphetamine causes increased activity and talkativeness, decreased appetite, and a pleasurable sense of well-being or euphoria.
- However, methamphetamine differs from amphetamine in that, at comparable doses, much greater amounts of the drug get into the brain, making it a more potent stimulant.
- The use of methamphetamine in higher doses can induce psychosis, **bleeding in the brain, skeletal muscle breakdown, and seizures.**
- Moreover, it can cause violent behavior, mood swings, and

psychosis such as paranoia, delirium, auditory and visual hallucination, and delusions when used chronically.

- It also has longer-lasting and more harmful **effects on the central nervous system.**
- Methamphetamine is potent and easy to produce. These characteristics make it a drug with high potential for widespread misuse.
- Chronic long-term methamphetamine use can be highly addictive, and if it is discontinued abruptly, it might lead to withdrawal symptoms that can be persistent for months after use.

### Birsa Munda

- Recently, Prime Minister Narendra Modi honored Bhagwan Birsa Munda on his birth anniversary, celebrated as Janjatiya Gaurav Divas.
- Birsa Munda (1875–1900) was a **prominent tribal leader, freedom fighter, and folk hero** from Eastern India.
- He was born on November 15, 1875, in Ulihatu village, **Jharkhand.**
- He belonged to the **Munda tribe**, a prominent tribal community in the Chotanagpur plateau.
- He fought against the oppressive British policies and the exploitation of tribal lands by landlords (**dikus**) and the colonial government.
- He advocated for tribal autonomy and protection of land through the **“Ulgulan”** (The Great Rebellion).
- He declared himself a prophet and began preaching the message of monotheism, unity, and social reform.
- He encouraged tribal people to return to their indigenous culture and reject

superstitions, alcohol consumption, and missionary conversions.

### About the Ulgulan Movement

- He led the Ulgulan (Revolt) in the late 1890s to reclaim tribal lands from British control.
- It was aimed to establish a **self-governing tribal system and abolish feudal landlordism.**
- He organized the Mundas and other tribal communities to resist through **guerrilla warfare.**
- He was arrested by British authorities in 1900 and imprisoned in Ranchi Jail, where he died on June 9, 1900 under mysterious circumstances.



## SPECIES IN NEWS

### Dicliptera srisailamica



- Recently, a team of botanists from the Botanical Survey of India (BSI) has identified *Dicliptera srisailamica*, a flowering plant found in the Eastern Ghats of Andhra Pradesh and Telangana.
- It is a **new plant species** belonging to the Acanthaceae family.
- It is named after the **temple town of Srisailam.**
- It was found in rare patches along stream banks and rocky edges near waterfalls.

### Features

- The plant is an erect herb, reaching up to 90 cm, with four-angled stems covered in fine, deflexed hairs when young.
- Its leaves are ovate, with prominent veins and smooth margins.
- The plant blooms with small, pink, bi-lipped flowers arranged in clusters,

commonly seen from October to January.

- It has short, downturned hairs on the stem and distinctive bracts around the flowers.
- The capsules containing the seeds are also covered in simple hairs.
- It adds to the diversity of this plant family, which is represented globally by 223 known species.
- In India, the *Dicliptera* genus includes 27 species, eight of which are endemic to the country.
- Andhra Pradesh alone is home to seven recorded species of *Dicliptera*, contributing significantly to the flora of the Eastern Ghats.
- This discovery adds to the diversity of India's flora, as *Dicliptera* is known for its tropical and subtropical presence worldwide.

### Zebrafish



- Recently, **Chinese** astronauts successfully reared four zebrafish in space which was part of the **Shenzhou-18 mission**.
- It is a small (2-3 cm long) freshwater fish found in tropical and subtropical regions.
- The vertebrate takes its name from the horizontal blue stripes running the length of its body.

- **Habitat:** It is native to **South Asia's Indo-Gangetic plains**, where they are mostly found in the paddy fields and even in stagnant water and streams.

### Features

- It attracts developmental biologists due to its adequate regeneration capacity of almost all its organs, including the brain, heart, eye, and spinal cord.
- It possesses several advantages over rodent models in the study of vertebrate development and disease.
- These include hundreds of embryos in a single clutch and optical clarity of the developing embryo (have transparent larvae and embryos), which allows live imaging at the organism level.
- They are easily bred in large numbers with a relatively low maintenance cost.
- Approximately 70 percent of zebrafish genes are also present in a similar form in humans.
- Over 80 percent of genes that are known to trigger disease in humans are also present in this fish.
- **Conservation status:** IUCN: Least concerned.

## PRACTICE QUESTIONS

**Q1: The term AI-enabled e-Tarang System has been in the news recently. It is related to which of the following options given below?**

- Agriculture
- Public Distribution System
- Higher Education

D. Defense

**Q2 : The Sambar Lake, an important Ramsar Site in India is located in which of the following states?**

- A. Maharashtra
- B. Madya Pradesh
- C. Rajasthan
- D. Haryana

**Q3 : Consider the following statements regarding Methamphetamine**

1. It is a powerful, highly addictive stimulant that affects the central nervous system.
2. It is in the form of a white, odorless, bitter-tasting crystalline powder that easily dissolves in water or alcohol.
3. It can induce psychosis, bleeding in the brain, skeletal muscle breakdown, and seizures.

**How many of the above statements are incorrect?**

- A. Only One
- B. Only Two
- C. All of the above
- D. None of the Above

**Q4 : Consider the following statements regarding Birsa Munda**

1. He was a prominent tribal leader, freedom fighter, and folk hero from Maharashtra
2. He organized the Mundas and other tribal communities to resist through guerrilla warfare.

3. He advocated for tribal autonomy and protection of land through the "Ulgulan" (The Great Rebellion).

**How many of the above statements are correct?**

- A. Only One
- B. Only Two
- C. All of the Above
- D. None of the Above

**Q5 : Consider the following statements regarding Hydrogen Fuel Cell based vehicles**

1. The hydrogen fuel cell uses hydrogen and air to generate electricity, producing only heat and water in the process.
2. They produce no tailpipe emissions.
3. Hydrogen is more explosive than petrol.

**How many of the above statements are correct?**

- A. Only One
- B. Only Two
- C. All of the Above
- D. None of the Above

#### Answers

1. D
2. C
3. C
4. B
5. C