Abode for Affordable Success

WEEKLY CURRENT AFFAIRS

1st Week of September 2022 Current Affairs

CERVAVAC

GS: III Science & Technology

Context

Union Minister of Science and Technology Dr Jitendra Singh on September 1 announced the scientific completion of Cervavac, India's first indigenously developed quadrivalent human papillomavirus (qHPV) vaccine for the prevention of cervical cancer.

Key points

- Despite being largely preventable cervical cancer is the fourth most common cancer among women globally, according to the WHO.
- In 2018, an estimated 570, 00 women were diagnosed with the disease and it accounted for 311, 000 deaths across the world.

Cervical Cancer in India

- India accounts for about a fifth of the global burden of cervical cancer, with 1.23 lakh cases and around 67, 000 deaths per year.
- Almost all cervical cancer cases are linked to certain strains of human papillomavirus (HPV) a common virus that is transmitted through sexual contact.
- While the body's immune system usually gets rid of the HPV infection naturally within two years, in a small percentage of people, the virus can linger over time and turn some normal cells into abnormal cells and then cancer, according to the Centres for Disease Control and Prevention (CDC).

Prevention

- Cervical cancer is preventable if detected early and managed effectively; it kills one woman every 8 minutes in the country.
- Screening and vaccination are two powerful tools that are available for preventing cervical cancer.
- Still, there is little awareness among women about the prevention of this cancer and less than 10 per cent of Indian women get screened.
- All women aged 30-49 must get screened for cervical cancer even if they have no symptoms and get their adolescent daughters vaccinated with the HPV vaccine.

qHPV vaccine

- Cervavac was developed by the Pune-based Serum Institute of India in coordination with the Government of India's Department of Biotechnology (DBT).
- Cervavac received market authorisation approval from the Drug Controller General of India on July 12 this year.

Effectiveness

- HPV vaccines are given in two doses and data has shown that the antibodies that develop after both are administered can last up to six or seven years.
- Unlike Covid vaccines, booster shots may not be required for the cervical cancer vaccine.
- Till now, the HPV vaccines available in India were produced by foreign manufacturers at an approximate cost of Rs 2, 000 to Rs 3, 500 per dose.

Cervavac is likely to be significantly cheaper, slated to cost approximately Rs 200 to 400.
It has also demonstrated a robust antibody response that is nearly 1, 000 times higher than the baseline against all targeted HPV types and in all doses and age groups.

Challenges

- The biggest task will be in allocating adequate resources and manpower for vaccinating the massive demographic of adolescent girls aged between 9 and 15, to ensure that they are protected from HPV early on.
- There is a huge need for stepping up awareness about the disease and the vaccine in the community.

Conclusion

- Unlike Covid and the vaccination programme, there is very little awareness about cervical cancer.

- Overall awareness and screening are very low in the community and that is a concern.
- This is a preventable disease and hence a huge awareness programme is required.

INS VIKRANT

GS: III Science & Technology

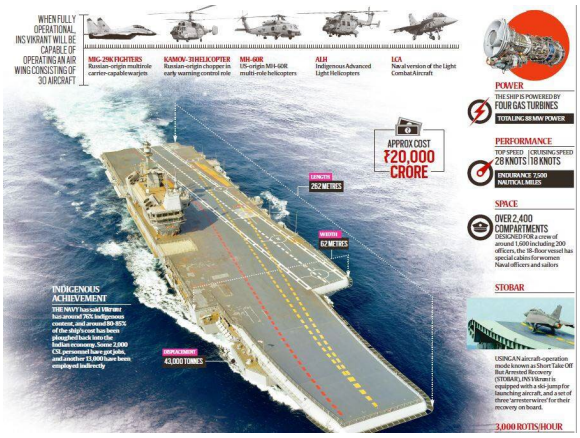
Context

The commissioning of the Navy's first Indigenous Aircraft Carrier (IAC-1) as INS Vikrant by Prime Minister Narendra Modi on Friday will mark a defining moment for India.

In its new Avatar, Vikrant will enhance India's standing as a blue water Navy a maritime force with global reach and capability to operate on the high seas far from the country's shores.

From Vikrant to Vikrant

- The original INS Vikrant, with pennant number R11, was the Indian Navy's first aircraft carrier.
- It was purchased by India from the UK in 1957 and was commissioned in the Indian Navy as INS Vikrant in 1961.
- The ship, which had less than half the displacement of the new Vikrant and was 50 m shorter in length, led the Naval blockade of East Pakistan during the 1971 war.
- It was decommissioned in 1997.
- The Sanskrit word Vikrant means Courageous or steeping beyond, which appears in various scriptures including the first chapter of the Bhagavad Gita.
- The same chapter contains the word viraat, meaning magnanimous, which became the name of the Navy's second, now decommissioned, aircraft carrier.
- The new Vikrant will carry the motto of its predecessor, Jayema sam yudhi sprudhah an expression that appears in the Rig Veda and means “We conquer those who fight us in war".
- When fully operational, INS Vikrant will be India's airbase on the blue oceans and act as a powerful deterrent against enemies.



Design and construction

- Vikrant has been built at an approximate cost of Rs. 20, 000 crores.
- Due to the indigenous components and construction, 80-85 per cent of the cost has been ploughed back into the Indian economy, the Navy has said.
- The design and construction of the IAC were sanctioned in January 2003.
- The ship's keel was laid in 2009 and it was launched on August 12, 2013.
- The readiness of the propulsion and power generation equipment was tested in November 2020 and four sea trials took place between August 2021 and July 2022.
- The ship was delivered to the Navy on July 28.
- When fully operational, INS Vikrant will be capable of operating an Air Wing consisting of 30 Aircraft.
- It has a length of 262 meters and a width of 62 meters and is powered by four Gas Turbines with 88 MW power.

Key features

Performance

It has a top seep of 28 Knots, a Cruising speed of 18 Knots and an Endurance of 7, 500 Nautical Miles.

Space

Over 2, 400 compartments Designed for a crew of around 1, 600 including 200 officers, the 18-floor vessel has special cabins for women naval officers and sailors.

16-Bed Hospital

The medical complex on board has a 16-bed hospital along with a modular emergency operation theatre, physiotherapy clinic, Intensive Care Unit, Pathology set up, radiology wing with a CT scanner and X-ray machines, a dental complex, isolation ward and telemedicine facilities.

Huge Aviation Hanger

The aviation hanger is as big as two Olympic-sized pools that can accommodate around 20 Aircraft.

3, 000 Rotis/ Hour

A well-equipped kitchen on board can serve a diverse menu to the crew. It has a unit that can make 3, 000 Rotis an hour important given the ship's crew is 1, 600 strong.

STOBAR

Using an aircraft-operation mode known as Short Takeoff but Arrested Recovery (STOBAR), INS Vikrant is equipped with a ski-jump for launching aircraft and a set of three arrester wires for their recovery on board.

Conclusion

Fight trials are set to begin by November and the carrier is expected to be fully operational by mid-2023, vice chief of Naval Staff, Vice Admiral S N Gormade, has said.

BAN ON SINGLE-USE PLASTICS

GS: II Governance

CONTEXT

The Ministry of Environment, Forest and Climate change, Government of India, notified the Plastic Waste Management Amendment Rules, 2021. The country is taking steps to curb littered and unmanaged plastic waste pollution.

Since July 1, 2022, India has banned the manufacture, import, stocking, distribution, sale, and use of single-use plastic (SUP) items with low utility and high littering potential.

India is a party to the United Nations Environment Assembly (UNEA).In all, 124 nations are party to the UNEA, and India has signed a resolution to draw up an agreement in the future that will make it legally binding for signatories to address the full life cycle of plastics, from production to disposal.

HARMFUL EFFECTS OF PLASTICS

- Plastic waste has drastic impacts on the environment and human health.
- There is a greater likelihood of single-use plastic products ending up in the sea than reusable ones.

RESOLUTIONS ADOPTED

- India piloted a resolution on single-use plastics pollution at the 4th United Nations Environment Assembly in 2019, recognizing the urgent need for the global community to address this issue. This resolution was adopted at the UN Environment Assembly as an important step forward.
- In the recently concluded 5 Th session of the United Nations Environment Assembly in March 2022, India engaged constructively with all member states to develop a consensus on a resolution to drive global action against plastic pollution.
- Bangladesh became the first country to ban thin plastic bags in 2002
- New Zealand banned plastic bags in July 2019
- China issued a ban on plastic bags in 2020 with a phased implementation.
- As of July 2019, 68 countries have plastic bag bans with varying degrees of enforcement.

PLASTIC WASTE MANAGEMENT RULES IN INDIA

- With effect from September 30, 2021, the Plastic Waste Management Amendment Rules 2021 prohibited the manufacture, import, stocking, distribution, sale, and use of plastic carry bags whose thickness is less than 75 microns.
- From December 31, 2022 plastic carry bags whose thickness is less than 120 microns will be banned.
- Ban does not cover all plastic bags; however, it requires the manufacturers to produce plastic bags thicker than 75 microns which were earlier 50 microns.
- As per the notification, the standard shall be increased to 120 microns in December this year.
- The notification mentioned that plastic or PVC banners /hoardings should have more than 100 microns in thickness, and nonwoven plastic must be more than 60 GSM (grams per square meter)
- Non-woven plastic bags have a cloth-like texture but are counted among plastics.
- Plastic or PET bottles, counted among the most recyclable types of plastic, have been left out of the scope of the ban.

STEPS TAKEN BY THE INDIAN GOVERNMENT

- The Indian government has taken steps to promote innovation and create an ecosystem for accelerated adoption and availability of alternatives across the country.
- To ensure effective enforcement of the ban, national and state-level control rooms will be established, as well as special enforcement teams to

check the illegal sale and use of single-use plastics
- Border checkpoints have been established to prevent the movement of banned single-use plastic items between states and Union Territories.
- Central Pollution Control Board has launched a grievance redressal application to empower citizens to help curb the plastic menace.
- Government taking measures for awareness generation campaign.

ROLE OF MANUFACTURERS

- Extended Producer Responsibility (EPR) is the responsibility of a producer for the environmentally sound management of the product until the end of its life
- The guidelines provide a framework to strengthen the circular economy of plastic packaging waste and promote the development of new alternatives to plastic packaging.

CHALLENGES

The Challenge is to see how the local level authorities will enforce the ban following the guidelines.

Banned items such as ear buds with plastic sticks, plastic sticks for balloons, etc. are non-branded items and it is difficult to find out who the manufacturer is and who is accountable for selling because these items will be available in the market even after the issuing of guidelines.

ON THE RESEARCH AND DEVELOPMENT FRONT

To find sustainable alternatives, companies need to invest in research and development.

CONCLUSION

Finding alternatives to plastic seems a little difficult however greener alternatives to plastic may be considered a sustainable option.

While the total ban on the use of plastic sounds like a great idea, its feasibility seems difficult at this hour, especially in the absence of workable alternatives.

INDIA'S NAVAL ENSIGN

GS: III Science & Technology

Context:

The new naval ensign for the Indian navy will be unveiled on September 2nd, on the sidelines of the commissioning of India's first indigenous aircraft carrier INS Vikrant.

The significance of having a new naval design and old ensign which bears the Saint George's Cross will be explained.

Replacement:

- The new naval ensign who will be unveiled in Kochi will replace the present ensign which carries the Saint George's Cross with the Tricolor in the canton (top left corner of the flag).
- This ensign is essentially a successor to the pre-independence ensign of the Indian Navy which had the red George's Cross on a white background with the Union Jack of the United Kingdom on the canton.
- The design of the new ensign was not yet been made public.
- After independence, on August 15, 1947, the Indian Defence forces continued with the British colonial flags and badges.
- It was only on January 26, 1950, that a changeover to Indianised pattern was made.
- The navy crest & flag were changed but the only difference made to the flag was that the Union Jack was replaced with the tricolour and George's cross was retained.

Previous changes:

- A change in the naval ensign was made in 2001 when the George's Cross was replaced with the naval crest in the middle of the white flag while the tricolour retained its place on the top left corner.
- There was a long pending demand for a change in the naval ensign with the original suggestion for change has come from a flag officer.
- In 2004, the ensign was again changed back to the Red George's Cross as there were complaints that the new flag was indistinguishable because the blue of the navy crest merged with the skies & seas.
- A change was made in the flag & the red George's Cross now had the state emblem derived from the Lion Capital of Ashoka in the middle.
- In 2014, another change was made when the words "Satyamev Jayate" were included on the flag below the Ashoka emblem in Devanagari Script.

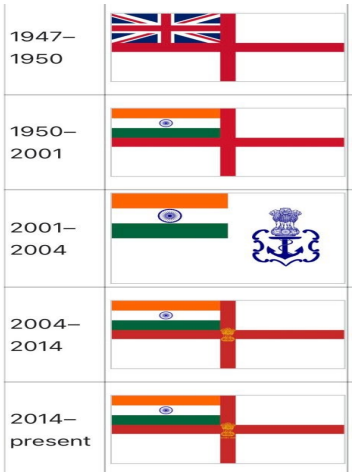
Saint George's Cross:

- The Red Cross on a white background is known as the Saint George's Cross and is named after a Christian Warrior Saint who is said to have been a crusader during the third crusade.
- This cross also serves as the flag of England which is a constituent of the UK.
- The flag was adopted by England in 1190 to identify English ships entering the Mediterranean.

- The Royal Navy adopted the George's Cross to fly on their ships in various shapes & forms and the present pattern was adopted around 1707.

Other countries:

- Most commonwealth countries retained the Red George's Cross during independence, but several have done away with it on their respective naval ensigns over the years.
- Among them are Australia, New Zealand, and Canada.
- The Royal Canadian Navy adopted a new design in 2013 which has the Canadian flag in the top left corner and the Canadian naval crest on white background.
- The Australian navy changed its ensign in 1967 and now has Union Jack, 6 blue stars positioned as in the Australia flag, on white background.
- The New Zealand navy did away with the George's Cross in 1968 and replaced it with a white flag bearing Union Jack in the top left corner & 4 red stars.
- The South African naval ensign has a green cross instead of the Red George's Cross.
- Pakistan navy has its naval crest on the ensign while the Bangladesh navy has a white flag with Bangladesh national flag in the top left



Anti-Radiation Pills

GS II: International Relations

Context:

The European Union decided to preemptively supply 5.5 million anti-radiation pills to be distributed among the residents of the vicinity, with the fears of nuclear disaster at Ukraine's Zaporizhzhia power plant growth.

The pills are to be taken only when there is a radiation leak.

Radiation emergency:

- A radiation emergency is an unplanned event or an intentional act that creates a radio-nuclear hazard to humans and the environment.

- These situations involve radiation exposure from a radioactive source & require prompt intervention.

Anti-Radiation Pills:

- Potassium iodide (KI) tablets or anti-radiation pills are known to provide some protection in case of radiation exposure.
- They contain non-radioactive iodine which can help in blocking the absorption of radioactive iodine in the thyroid gland.
- After a radiation leak, radioactive iodine floats through the air and then contaminates food, water and soil.
- While radioactive iodine deposited during external exposure can be removed by using warm water, and soap; inhaling it poses a bigger risk, as per WHO.
- The thyroid gland, which uses iodine to produce hormones to regulate the body's metabolism, has no way of telling the difference between radioactive & non-radioactive iodine.
- Potassium iodide is a salt that protects us from radioactive iodine.
- Thyroid gland is a part of our body that is most sensitive to radioactive iodine.
- KI can help block the thyroid from absorbing radioactive iodine if it is inhaled.
- But, KI can't protect the rest of the body from radioactive iodine.
- It also cannot reverse any health issues caused by radioactive iodine if the thyroid is already damaged.
- The Food & Drug Administration (FDA) released guidance on how to safely use potassium iodide.
- In pill, liquid form, it can help protect during a nuclear radiation emergency.
- When potassium iodide is taken, the thyroid absorbs it and if the right amount is taken at right time, it will saturate the thyroid gland.
- This can help block any inhaled or ingested radioactive iodine from being absorbed by the thyroid which lowers the risk for radiation damage to the gland.

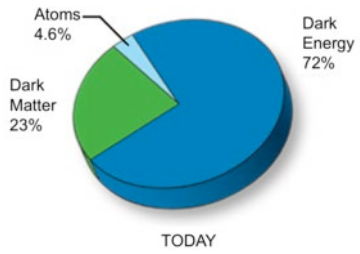
Dark Energy

GSIII: Science & Technology

Dark Energy:

- Our universe is expanding at an accelerating rate & the reason is unknown. This seemingly contradicts current scientific knowledge of how gravity works & affects the world we live in.
- The cause of this acceleration is called "Dark Energy" and is a mystery.

- NASA scientists are helping probe this enigma by testing gravity.
- According to the space agency, this phenomenon where the universe is expanding at an accelerating rate is almost as if an apple is thrown in the air and it continued to move upwards faster and faster.
- The latest effort to understand whether this is all a misunderstanding from a new study by Dark Energy Survey (DES).
- DES is an international collaborative effort that maps hundreds of millions of galaxies, detects thousands of supernovae & finds patterns of cosmic structure.
- The new study uses the 4-meter Victo M Blanco Telescope in Chile to conduct the most precise tests by space agency yet of Albert Einstein's theory of gravity at the cosmic scale.
- The results were presented at the International Conference on Particle Physics & Cosmology in Rio de Janeiro.
- Einstein's theory of General Relativity was developed more than a century ago & describes gravity in a way that has accurately predicted various phenomena, including the existence of black holes.
- According to some scientists, there may be a need to modify some of its equations or add new components if it can't explain dark energy.
- DES members looked for evidence that gravity's strength has varied throughout the universe's history or over distances.
- If that were the case, it would indicate that Einstein's theory is incomplete, which would bring us closer to explaining the universe's accelerating expansion.
- In addition to the Blanco telescope, the members also examined data from ESA's Planck satellite.
- But the study found that Einstein's theory still holds, meaning that there is still no explanation for dark energy.
- To arrive at this conclusion, scientists needed to look deep into the universe's past, which was done by looking at objects that are far away.
- A light year is about 9.5 trillion kilometers or the distance that light can travel in a year, which means that billions of light-years away galaxies appear as if billions of years ago.
- The observations made by the scientist matched the predictions of Einstein's theory, leaving dark energy with no explanation.
- This research will be furthered by two upcoming NASA missions.
- Euclid, slated for a 2023 launch & Nancy Grace Roman Space Telescope, scheduled for a 2027 launch.
- Both telescopes will help scientists look further back in time to further probe the presence of dark energy.



UNITED NATIONS HIGH SEAS TREATY

GSII: International relations

CONTEXT

Negotiations involving 168 countries including European Union to agree on a UN treaty for protecting oceans failed on Saturday in New York. The agreement intends for conserving marine life on the high seas which lie outside the exclusive jurisdiction of individual countries

AIM

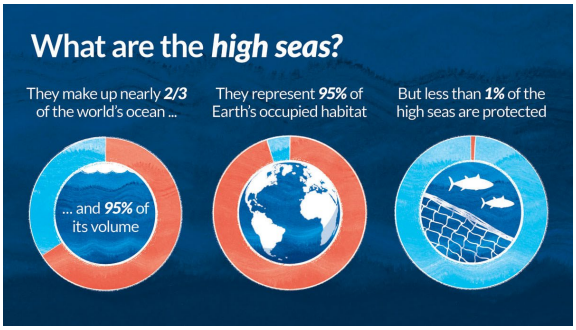
To protect and manage the high seas –parts of the ocean beyond national jurisdictions

ABOUT

It is also referred to as Paris Agreement for the ocean

The proposed treaty concerns the ocean existing beyond the Exclusive Economic Zones which extend from the coastlines of nations up to around 200 nautical miles or 370 km into the seawaters beyond that are known as open seas or high seas.

The treaty was to be negotiated under the United Nations Convention on Laws of the Sea (UNCLOS) OF 1982 which governs the rights of countries regarding marine resources. A UN resolution in 2017 had decided to rectify the treaty by 2022.



CONCERNS OF TREATY

- Establishing marine protected areas to put limits on certain activities
- Environment Impact Assessments
- Clearances for the sustainability of works
- Financial support to countries
- Sharing of scientific knowledge

The International Union for Conservation of Nature (IUCN) has said binding

agreements are needed for this treaty to be effective.

UNCLOS

- It regulates the conduct of actors on the high seas.
- It led to the establishment of territorial sea boundaries 22 km offshore, deciding the region up to which countries could claim full sovereign territorial rights, as well as the 200 nautical miles EEZ limit.
- It also created the International Seabed Authority and other conflict resolution mechanisms.

But a treaty dedicated to protecting ocean health does not exist as of now. Every country has the right to access the open seas, resulting in large–scale drilling and trawling operations.

WHY TREATY IS NEEDED URGENTLY

- Ocean warming remains a major threat
- The effects of ocean warming include sea level rise due to thermal expansion, coral bleaching, accelerated melting of Earth's major ice sheets, intensified hurricanes, and changes in ocean health and biochemistry.
- Excessive fishing has increased manifold over the years and a third of species such as sharks and rays are at the risk of extinction

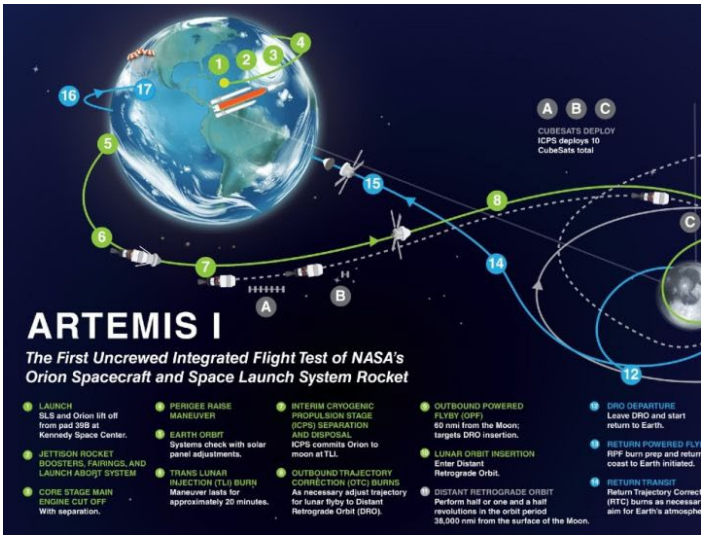
DESTINATION MOON AND BEYOND- ARTEMIS I

GSIII: Science & Technology

1. Background

- Artemis I, formerly Exploration Mission-1, will be the first integrated test of **NASA's deep space exploration systems:** the Orion spacecraft, Space Launch System (SLS) rocket and the ground systems at Kennedy Space Center in Cape Canaveral, Florida.
- The first in a series of increasingly complex missions, Artemis I will be an uncrewed flight test that will **provide a foundation for human deep space exploration, and demonstrate our commitment and capability to extend human existence to the Moon and beyond.**
- During this flight, the spacecraft will **launch on the most powerful rocket in the world** and fly farther than any spacecraft built for humans has ever flown.
- It will travel **280,000 miles from Earth**, thousands of miles beyond the Moon throughout about a four to six-week mission.

- Orion will stay in space longer than any ship for astronauts has done without docking to a space station and return home faster and hotter than ever before.
- Artemis I will be the **first in a series of increasingly complex missions to build a long-term human presence on the Moon** for decades to come.
- The primary goals for Artemis I are to **demonstrate Orion's systems in a spaceflight environment and ensure a safe re-entry, descent,** splashdown, and recovery before the first flight with the crew on Artemis II.



2. Space development so far

- It has been 50 years since the **six Apollo human moon** landings between 1969 and 1972. There has been huge progress in space exploration since then.
- Spacecraft have now gone **beyond the solar system**, exploratory missions have probed Mars, Jupiter and Saturn, **more than 500 astronauts have travelled to space and back, and permanent space laboratories like the International Space Station (ISS) have been set up.**

3. How the Artemis missions make the difference

- However, the promise of transporting human beings to new worlds, the possibility of landing, and living, on other planets, or travelling deep into space, probably even encountering aliens, has remained stagnant since the last of the 12 astronauts to set foot on the Moon returned in 1972.
- This is why **Artemis 1** is being seen as ushering in a new space age. It is the first in a series of ambitious missions that are planned to take human beings back to the Moon, explore possibilities of extended stay there, and investigate the potential to use it as a launch pad for deep space explorations.
- On the face of it, Artemis 1 has extremely humble mission objectives. It is technically only a lunar Orbiter mission. It is not carrying any astronauts.

- It does not even have a lander or rover component.
- The mission's spacecraft, called Orion, will get into a lunar orbit that would be about 97 km from the Moon's surface at its closest.
- But unlike most other Orbiter missions, Orion has a return-to-Earth target after it has orbited the Moon for about a month.

4. How the Artemis Mission different from earlier missions

- Although the objective is to ensure the return of human beings to the Moon, the Artemis missions are going to be qualitatively very different from the Apollo missions.
- In many ways, the Moon landings of the 1960s and 1970s came a little too early in the space age. The man had reached the Moon just 12 years after the first-ever satellite, Sputnik, had been launched.
- The Apollo missions were guided by geo-political considerations, and the desire of the United States to go one up on the Soviet Union which had taken a considerable lead in space technology, having sent the first satellite in space, the first spacecraft to crash on to the lunar surface, and the first astronaut in space.
- The **Artemis missions** are in a position to exploit the major advancements in space technologies over the years. These technologies now make it possible to start extracting the resources found on the Moon, build from the materials available there, and harness hydrogen or helium as an energy source. Not all of that would happen with the first mission itself, but these things are distinctly possible now, making human landings on the Moon much more meaningful than earlier.

5. The significance

- Artemis 1 is all about laying the foundations for more complex and ambitious missions. It is carrying several payloads in the form of small satellites called CubeSats, each of which is equipped with instruments meant for specific investigations and experiments. The focus of these investigations is clearly to explore the long-term stays of human beings in space and on the Moon. One Cube Sat will search for water in all its forms; another will map the availability of hydrogen that can be utilised as a source of energy. Then there are biology experiments, investigating the behaviour of small organisms like fungi and algae in outer space, and the effect of radiation, especially the reaction on their genes.
- The Orion spacecraft, which is specifically designed to carry astronauts into deep space on future

missions, will have three dummy 'passengers' — mannequins made of material that mimic human bones, skin, and soft tissue. These would be equipped with a host of sensors to record the various impacts of deep space atmosphere on the human body.

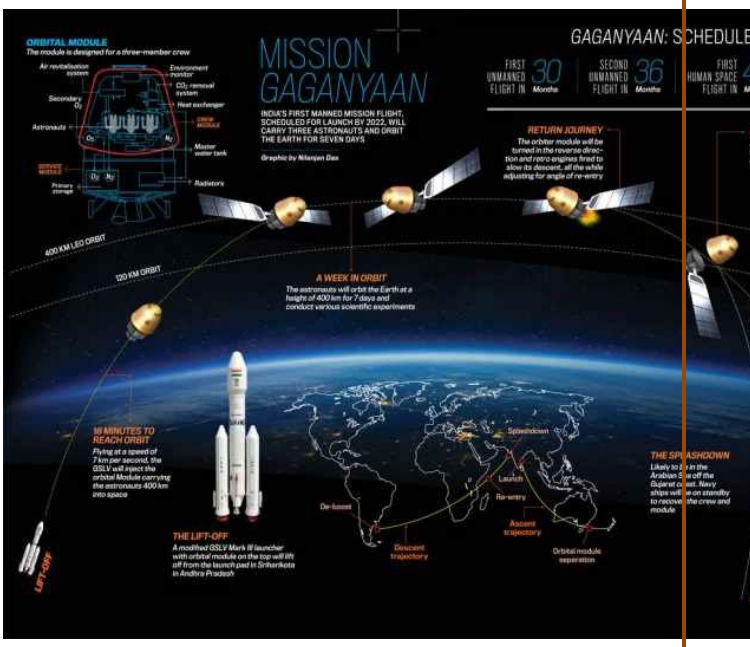
- The rocket that is being used for the Artemis missions, called Space Launch System, or SLS, is the most powerful ever built, more powerful than the Saturn V rockets that had taken the Apollo missions to the Moon. The giant, 98-metre-tall rocket, weighing 2,500 tonnes, can help the Orion spacecraft achieve speeds of over 36,000 km per hour, and take it directly to the Moon, which is 1,000 times farther than the International Space Station that sees regular traffic of astronauts.

6. Abortion of the mission

- The problem had been detected a few hours ahead of the launch.
- The flow of liquid hydrogen to one of the four engines of the rocket was not found to be optimal, which could have resulted in overheating.

7. Similar manned space projects proposed by India

- The Gaganyaan programme is an indigenous mission that would take Indian astronauts to space.
- It is an Indian crewed orbital spacecraft that is intended to send 3 astronauts to space by 2022, as part of the Indian Human Spaceflight Programme. The programme will make India the 4th nation in the world to launch a Human Spaceflight Mission.

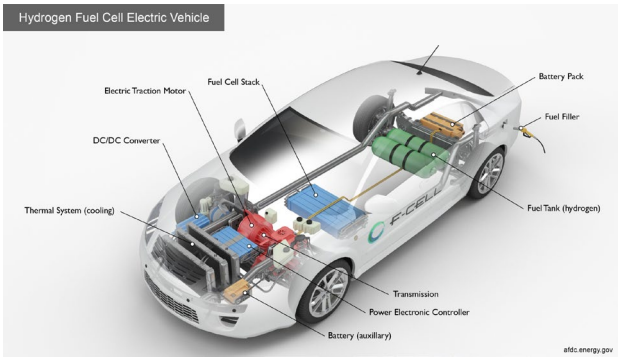


FUEL CELL ELECTRIC VEHICLE (FCEV)

GSIII: Science& Technology

1. Background

- Fuel cell electric vehicles (FCEVs) are powered by hydrogen. They are more efficient than conventional internal combustion engine vehicles and produce no tailpipe emission they only emit water vapour and warm air.
- FCEVs and the hydrogen infrastructure to fuel them are in the early stages of implementation.
- The need to combat temperature change and stall ecological degradation has created itself felt with pressing significance.
- With leading nations across the planet actively attempting to succeed in the net-zero emissions goal within the next few decades, the search to hunt energy sources has become a lot of earnest than ever before. Bharat too has set an associate bold target of reducing the emissions intensity of its economy by forty-five per cent by 2030.
- In such a state of affairs, gas fuel might be a cost-effective, effective and semi permanent various to fossil fuels like fuel or diesel. Whereas gas cell technology is one section, that many automakers around the world area unit operating for quite a while, in India, gas cell technology remains within the antenatal stage.
- Countries just like the US, Germany, South Korea, China and Japan have already deployed a fleet of hydrogen-fuelled business vehicles. The French government too aims to use gas cell technology in transportation. However, the event of gas cell technology in Bharat isn't enough, despite the country being one of the main automobile markets in the world.



2. about Cell Technology

- **Fuel cell technology** depends on the energy of gas to get electricity cleanly and effectively. In contrast to primary fuels like coal and crude, or renewable energy sources like wind or solar energy, gas is an associate energy carrier. This suggests that gas is needed to be created victimisation primary sources of energy, like gas, water, biomass, etc. Once procured, gas may be accustomed to providing electricity across sectors, together with industrial and business buildings, transportation, and semi permanent grid-based energy storage in reversible systems.

- **Fuel cell electric vehicles (FCEVs)** area unit steam-powered by gas. Like all electrical vehicles, FCEVs

use electricity to power an electric motor. However, rather than victimisation electricity through batteries that draw power from the grid to operate, FCEVs generate electricity by employing a cell stack steam-powered by gas, that is held on on-board.

3. Benefits of cell electrical vehicles:

- FCEVs area unit among the cleanest modes of transportation as they unharness no harmful pipage emissions, and solely emit water vapour and heat air. With future technical enhancements, there'll be a forecasted improvement in overall WTW (well-to-wheel) potency for FCEVs that is pegged at around 30–35 per cent nowadays.
- FCEVs may be instrumental in achieving energy security and fulfilling de-carbonisation goals. Whereas it's crucial to recollect battery electrical vehicles (BEVs) and FCEVs don't seem to be competitive however complementary technologies, hydrogen-operated EVs provide some necessary edges over lithium-powered BEVs.
- In the context of sure duty cycles and applications, they possess higher energy density (more energy per unit mass), need shorter fuelling durations, and have long-range applications that don't seem to be viable with BEVs due to the constraints of Li-ion batteries. With associated inherent renewability part and no emissions, FCEVs also are environmentally friendly.
- In explicit, transitioning to gas cell heavy-duty vehicles will have a major impact on reducing greenhouse emissions. within the close to future, gas fuel cells are key in achieving higher vary applications (exceeding five hundred km) due to quicker refuelling and better density.

4. Challenges for the adoption of cell electrical vehicles in India:

- **However, despite gas being a promising various fuel resolution, there is a unit many challenges for Bharat to adopt this technology, a minimum of in close to future.**

- **Lack of infrastructure:** Infrastructure remains a significant hindrance previous to the expansion of gas cell technology steam-powered vehicles. In India, the gas cell dispensing fuel stations area unit solely a couple of, that approach less than adequate encourage the automakers and vehicle consumers to adopt gas cell technology steam-powered vehicles.
- **Higher safety concern**: Safety could be a major concern around gas

cell technology. Gas fuel is very ignitable, even more than fossil fuels like fuel or diesel. It's not necessary to store the fuel in gas type solely; however alternative hydrogen-generating sources like methane series, propane, alcohols, or maybe regular fuel can also produce aerosolised gas within the vehicle itself. However, all of those are associated with various flammability problems and also the gas itself is very ignitable similarly, which brings the protection concern.

The possibility of electrical shock is another safety concern around gas cell technology. This technique electro-chemically combines gas with gas, and each of those area units is ignitable and generates voltage to power the vehicle and emits water rather than deadly pipage gases. Some gas cell motors run on voltages prodigious 350 volts.

Because something larger than fifty volts will stop an individual's heart, there are unit nice risks of electrical shock from a gas cell powertrain.

- **Not strong system:** in contrast to the gas or oil powertrains, the gas cell powertrains don't seem to be strong, due to their delicate and complex system. These powertrain technologies demand sensitive surroundings and atmosphere, as high or low temperatures may end up in the failure of the system. In a country like Bharat, wherever it's too hot and wet at places throughout summer and extreme cold within the northern part of the country throughout summer, the probability of breakdown for these powertrains area unit pretty high.
- **Quite costly:** gas cell powertrains area unit approach abundant expensive than typical burning engine technologies. These powertrains use extraordinarily rare-earth element metal like Pt., which ends within the production of gas fuel cells a great deal dearer than drilling transporting and purification of fossil fuels. Whereas it's expected that in future, gas fuel cells can pay for themselves in terms of the quantity of cash they'll save, however, the vessel's direct prices drive the investors away.

5. Initiatives by Government to promote electric vehicles

- The remodelled **Faster Adoption and Manufacturing of Electric Vehicles (FAME II) scheme**.
- **Production-Linked Incentive (PLI) scheme for Advanced Chemistry Cell (ACC)** for the supplier side.

- **PLI scheme for Auto and Automotive Components** for manufacturers of electric vehicles.
- **"Charging Infrastructure for Electric Vehicles—Guidelines and Standards,"** describing the roles and responsibilities of various stakeholders at the Central and State level for the expeditious deployment of public EV charging infrastructure across the country, has been issued recently.
- India is among a handful of countries that support the global **EV30@30 campaign**, which aims for at least 30% of new vehicle sales to be electric by 2030.
    - India's advocacy of five elements for climate change — "Panchamrit" — at the **COP26 in Glasgow** is a commitment to the same.
    - Various ideas were espoused by India at the Glasgow summit, such as renewable energy catering to 50% of India's energy needs, reducing carbon emission by 1 billion tonnes by 2030 and achieving **net zero by 2070**.

6. about Hydrogen

Type of Hydrogen

- **Grey Hydrogen**
    - It constitutes India's bulk production and is extracted from hydrocarbons (fossil fuels, natural gas).
    - It gives CO2 as by product
- **Blue Hydrogen**
    - It is also sourced from fossil fuels.
    - However, emissions/ by-products (CO, CO2) are captured and stored.
    - Thus, it is better than grey hydrogen
- **Green Hydrogen**
    - It is generated from renewable energy sources such as solar and wind.
    - The electricity splits water into hydrogen and Oxygen.
    - It gives water and water vapour as by-products.
    - Thus, it is the best and cleanest type

7. Initiatives by Government to promote Hydrogen fuel based technology

- India is already keen on developing a hydrogen economy owing to its favourable geographical conditions and presence of abundant natural elements.

- India has proposed a National Hydrogen Mission (NHM) that will draw up a roadmap for using hydrogen as an energy source.
- India is a part of the 'Hydrogen Valley Platform' that looks to create an integrated hydrogen ecosystem covering production, storage, distribution and end-use.
- More recently, in 2016, MNRE published a report laying out a comprehensive plan for increasing R&D activity.

8. Need of the Hour

- Hydrogen technology remains at an aborning stage within the country, and their area unit restricted infrastructure and scale of gas dispensing units offered. This makes the acquisition and total price of possession for FCEVs higher. Further, most gas production ways deployed nowadays accept fossil fuels.
- However, government incentives and localisation of core aggregates area units seem to cut back prices and improve the economic science of FCEV. A surge in the demand for this technology is predicted within the last half of the present decade.
- The new introduced National gas Energy Mission Programme by the Prime Minister aims to bring open access to renewable energy and increase the assembly of inexperienced gas (that doesn't accept fossil fuels to be produced).
- With these positive steps, one will expect a decisive move towards a property way forward for quality, with gas cell technology taking part in a predominant role across segments, publicly transport, business vehicles, and rider vehicles.

With reference to UNCLOS, which of the following is not correct?

a) It not only zones coastal states' offshore areas but provides specific guidance for states' rights and responsibilities in the five concentric zones.

b) It is the only international convention which stipulates a framework for state jurisdiction in maritime spaces.

c) Each coastal State may claim an EEZ beyond and adjacent to its territorial sea that extends seaward up to 200 nm from its baselines.

d) The ocean surface and the water column beyond the EEZ are referred to as the Contiguous Zone.

Answer (d)

Consider the following statements with respect to Artemis 1 and answer the question below.

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1. Artemis 1 is carrying several payloads in the form of small satellites called CubeSats.
2. The Orion spacecraft, which is specifically designed to carry astronauts into deep space on future missions, will have three dummy ‘passengers’.
3. Artemis I will be an uncrewed flight test that will provide a foundation for human deep space exploration.

Which of the following statements are true?

a) 1 and 3
b) 2 and 3
c) 1 and 2
d) All of the above

Answer (d)

Mains Questions

1. What is the significance of Artemis Mission, the beginning of a new age of human exploration of the moon? (250 words)

2. India needs to strengthen its maritime laws and regulatory mechanisms. Discuss (250 words)

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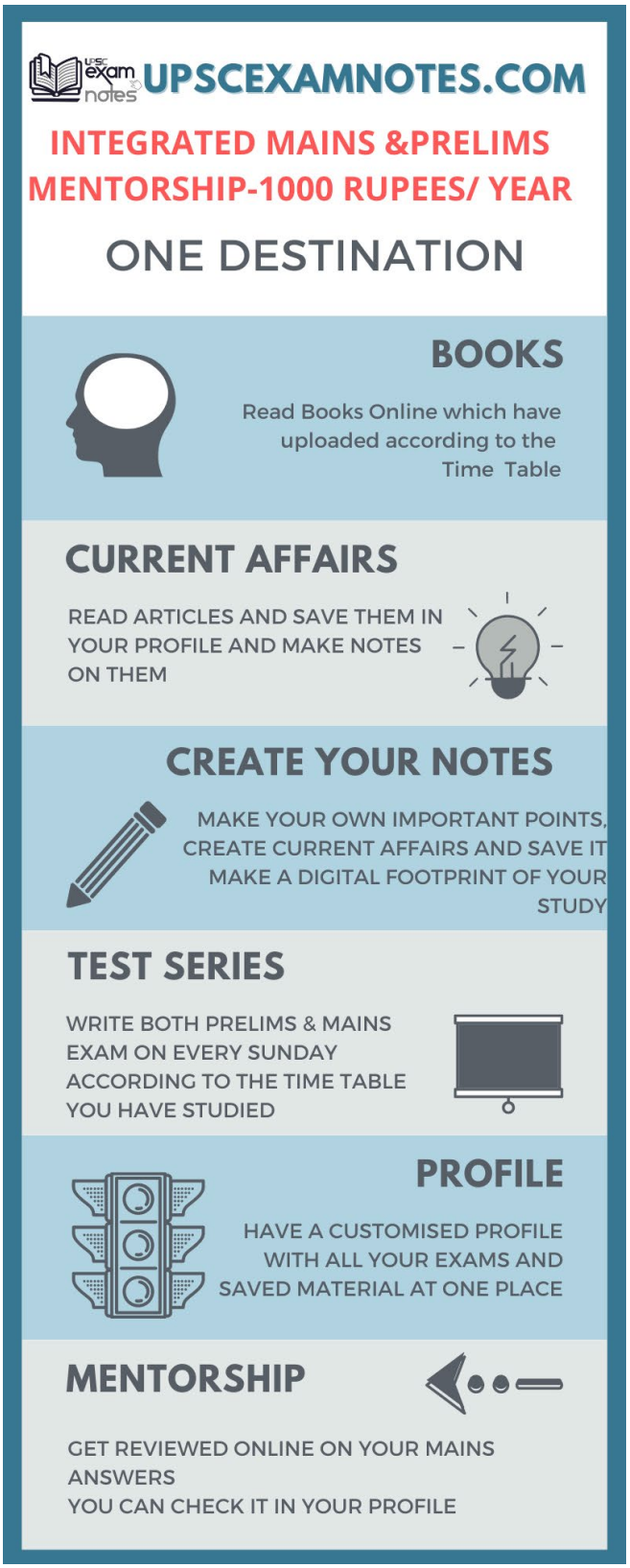

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