

02.11.2026 NEWS

SAMUDRA MANTHAN SCHEME

- India spends approximately Rs.14 lakh crore annually in foreign exchange on the import of hydrocarbons alone. This accounts for nearly one-third of the country's total revenue.
- When the Gulf War began, the price of crude oil in the global market, which was around $70 per barrel, reached a peak of $115. The impact of this price increase will be felt in the next budget.

» Depth of the Sea

- Offshore fields account for 53% of India's crude oil production and 72% of its natural gas production.
- Offshore areas containing hydrocarbons are classified according to water depth:
- - Shallow Water: Less than 400 metres.
- - Deep Water: More than 400 metres.
- - Ultra-Deep Water: More than 1,500 metres.
- ONGC, Vedanta, Reliance and British Petroleum (BP) are engaged in hydrocarbon exploration and extraction activities in India's offshore regions, either independently or through joint ventures.
- At present, most offshore hydrocarbon production takes place in shallow-water regions.

» Samudra Manthan

- Against this background, the Union Ministry of Petroleum released 148 pages of guidelines on 22 October 2026 for India's largest offshore oil and natural gas exploration initiative, known as Samudra Manthan.
- This scheme is one of the largest and historically significant initiatives undertaken to fully utilise deep-sea hydrocarbon resources, strengthen the country's economy and ensure energy security.
- India depends heavily on imports to meet its crude oil requirements and is the world's third-largest consumer of crude oil. Therefore, the primary objective of this scheme is to identify oil and natural gas resources in India's deep-sea regions and achieve self-reliance.
- Its major objective is to explore hydrocarbon resources in the deep-water and ultra-deep-water regions of the Krishna–Godavari, Cauvery, Mahanadi and Andaman basins.
- This initiative aims to increase overall hydrocarbon production and reserves by 30–40%.

» Brazil and Norway

- Brazil's crude oil production is approximately eight times that of India, while Norway's production is three times that of India.
- Similarly, their natural gas production is approximately four times and 3.5 times that of India, respectively.

- Unlike India, these countries produce several times more hydrocarbons than their domestic requirements and export the surplus.
- A major share of Brazil's production comes from deep-sea resources, while Norway is also a pioneer in offshore hydrocarbon production.
- However, Brazil and Norway have not been entirely free from allegations that deep-sea oil and natural gas production has affected fisheries and marine ecosystems.
- In Brazil, major oil spills associated with deep-sea production activities in the past are alleged to have severely affected coastal regions, wetlands and coral reefs.
- It is also alleged that the mixing of hydrocarbons with seawater has significantly affected fish, prawns and other marine organisms.
- As a result, the livelihoods of fishing communities in these regions have been threatened, and the tourism sector has also reportedly been affected.
- In Norway's North Sea region, saline water extracted along with crude oil during production is discharged back into the sea. There are concerns that this practice affects the reproduction of fish and shellfish in the region.
- Although deep-sea hydrocarbon production provides economic benefits to countries, environmentalists fear that it also creates irreversible threats to marine biodiversity and causes severe damage to fisheries.

NAVIC – INDIA'S INDIGENOUS NAVIGATION SYSTEM

- The Indian Space Research Organisation (ISRO) successfully launched the NVS-03 navigation satellite aboard the GSLV-18 rocket from Sriharikota on October 30, 2026.

» Benefits of NavIC

- NavIC stands for Navigation with Indian Constellation. It is India's regional navigation system, similar to the Global Positioning System (GPS) of the United States.
- It can provide navigation services across India and up to approximately 1,500 kilometres beyond its borders.
- To determine the location of your mobile phone or car, signals from at least four satellites are required. Three satellites help determine your position (latitude, longitude and altitude), while the fourth corrects the clock error in your device.
- Since 2013, India has launched 11 navigation satellites. However, most of the imported foreign atomic clocks installed in these satellites have malfunctioned.
- NVS-03 is the third satellite in the series of second-generation NavIC satellites.
- Once it successfully enters orbit and becomes operational, the NavIC system will have four operational satellites.
- Following the activation of NVS-03, navigation services can be obtained through NavIC.
- It is true that NavIC cannot provide worldwide services like GPS. Nevertheless, it can fulfil the basic navigation requirements of India and its surrounding regions.

» Need for NavIC

- The United States military has control over the GPS system. During the Kargil War, the United States deliberately disrupted GPS services in that region.
- A similar situation occurred during missile testing. India cannot ensure its national security by depending on such a system.

TUTICORIN 99445 11344 | TIRUNELVELI 98942 41422 | RAMANATHAPURAM 75503 52916 | MADURAI 98431 10566 | CHENNAI 97555 52003 | COVAI 90433 10773 | TENKASI 98840 51717 | SALEM 95147 89102

- China, Russia and Europe have also developed their own navigation systems. Therefore, NavIC is essential for India.
- A navigation satellite functions like a lighthouse that continuously broadcasts signals from space.
- It continuously transmits radio signals containing two pieces of information:
  - "Where am I located right now?"
  - "At what time did I transmit this signal?"
- Radio waves travel at the speed of light. When your mobile phone receives a signal from a satellite, it calculates how long the signal took to arrive and determines the distance between the satellite and your device.
- Using the distances from three satellites, your location can be determined through the method of trilateration.
- The fourth satellite is used to correct the timing error caused by the less accurate clock in your mobile phone, ensuring precision.

» Working Mechanism

- The functioning of a navigation satellite can be compared to crossing a river with a bicycle.
- First, we must carry the bicycle onto a boat and cross the river. After reaching the other side, we can ride the bicycle ourselves.
- Similarly, to reach outer space beyond the Earth's dense atmosphere, a launch vehicle must first place the spacecraft into a Geosynchronous Transfer Orbit (GTO). This is equivalent to the boat journey.
- Afterward, the satellite's onboard propulsion engine, called the LAM (Liquid Apogee Motor), operates and carries it to its final circular orbit at an altitude of approximately 36,000 kilometres. This is equivalent to the bicycle journey.
- When riding a scooter downhill, we can move at a considerable speed without continuously accelerating. Once we reach level ground, we accelerate again.
- Similarly, the satellite's LAM engine initially remains inactive. When the satellite reaches the appropriate orbital position, the LAM engine is activated.
- The satellite travels around the Earth several times in the transfer orbit. Each time it approaches the Earth at the appropriate point in its orbit, its engine operates to raise the orbit progressively.
- When the satellite reaches its target altitude, the engine is activated once again to place it into a circular orbit.

» Multiple Benefits

- In the future, ordinary smartphones and smartwatches will be able to directly receive India's NavIC services.
- Many Indian fishermen accidentally cross maritime boundaries into neighbouring countries, resulting in various difficulties.
- By using India's NavIC services, warnings can be provided to prevent Indian fishing boats from unintentionally entering foreign territorial waters. Distress signals can also be transmitted during emergencies.
- This is particularly important for fishermen in Tamil Nadu.
- Farmers can receive accurate weather forecasts and land surveying services.
- Navigation services can also support aircraft operations during adverse weather conditions, such as snowfall.
- Even if NVS-03 operates successfully, it will not be possible to obtain complete navigation services. At least seven satellites (three in geostationary orbit and four in inclined geosynchronous orbit) are required to provide adequate and independent navigation services.
- To ensure reliable services, a total of 10 to 15 NavIC satellites must be operational in space.
- ISRO will certainly achieve this milestone in the future as well!