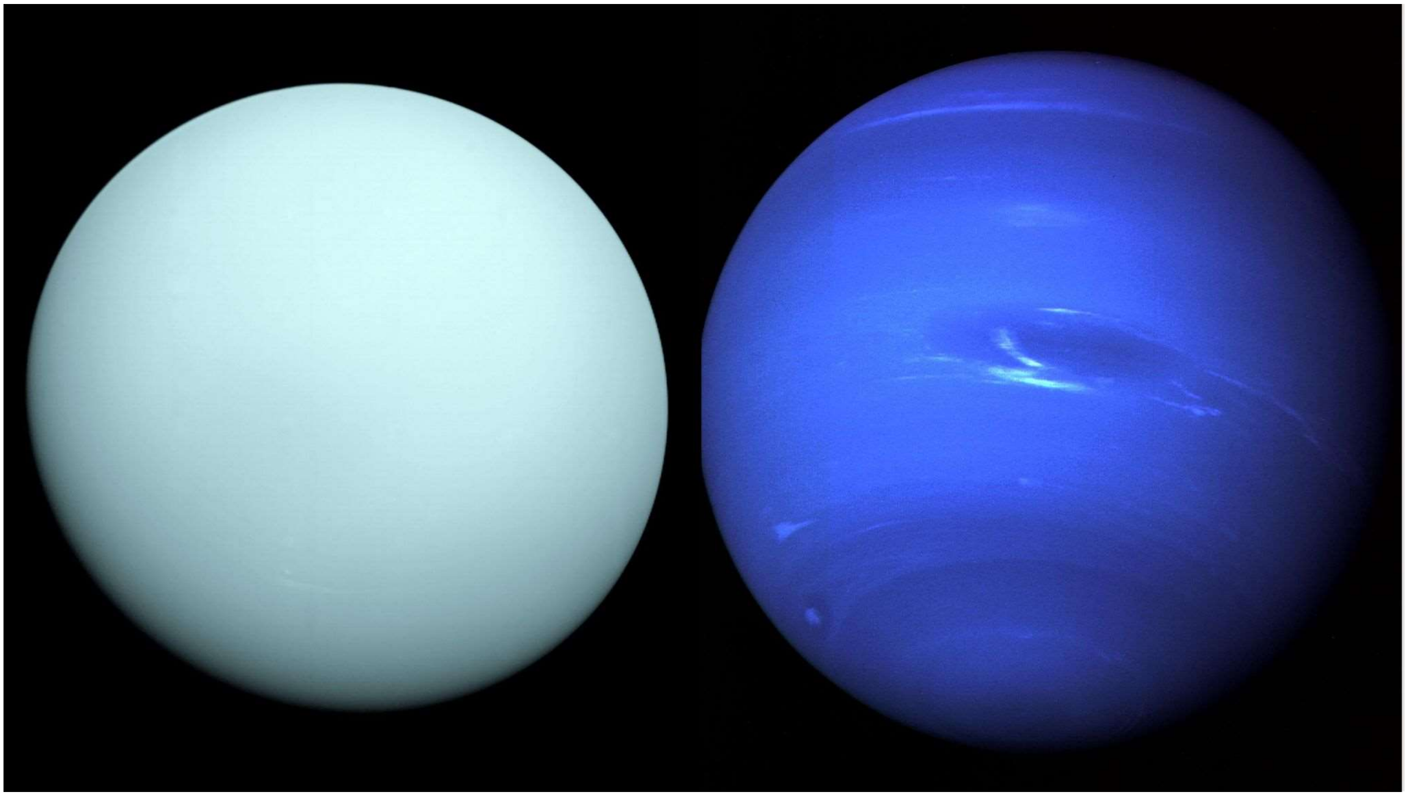
Why Neptune and Uranus appear in different colours

(GS Paper 3, Science and Tech)

Context:

- Neptune and Uranus have much in common, they have **similar masses, sizes, and atmospheric compositions** yet their appearances are in different shades of blue.
- At visible wavelengths, Neptune is a rich, deep azure hue, while **Uranus is a distinctly pale shade of cyan**. Astronomers now have an explanation for why the two planets are different colours.



New model:

- Previous studies of the spectrum of each planet concentrated on individual wavelength regions.
- In the new comparison, researchers have developed a **single atmospheric model** that matches observations of both planets from the NASA/ESA Hubble Space Telescope, as well as the Gemini North telescope and the NASA Infrared Telescope Facility.
- The model shows that the haze around Uranus is thicker than that around Neptune.

Key Observations:

- Uranus's stagnant, sluggish atmosphere and makes it appear a lighter tone than Neptune.
- If there was no haze in the atmospheres of Neptune and Uranus, both would appear almost equally blue as a result of blue light being scattered in their atmospheres.
- The model leading to this conclusion describes three aerosol layers in the atmospheres of Neptune and Uranus.
- The key layer that affects the colours is the middle layer, which is a layer of haze particles that is thicker on Uranus than on Neptune.

Turbulence in Neptune's atmosphere:

- On both planets, methane ice condenses onto the particles in this layer, pulling the particles deeper into the atmosphere.
- Because Neptune has a more active, turbulent atmosphere than Uranus does, the team believes Neptune's atmosphere is more efficient at churning up methane particles into the haze layer.
- This removes more of the haze and keeps Neptune's haze layer thinner than it is on Uranus, with the result that the blue colour of Neptune looks stronger.

<u>European Union's ban on Russian oil</u>

(GS Paper 2, International Institution)

Why in news?

- As part of the sixth package of sanctions since Russia's invasion of Ukraine, the European Union member states reached an agreement to **ban 90% of Russian crude oil imports by the end of 2022**.
- The partial embargo exempts pipeline oil in order to bypass Hungary's objections to the ban.

What was the original proposal of the oil embargo?

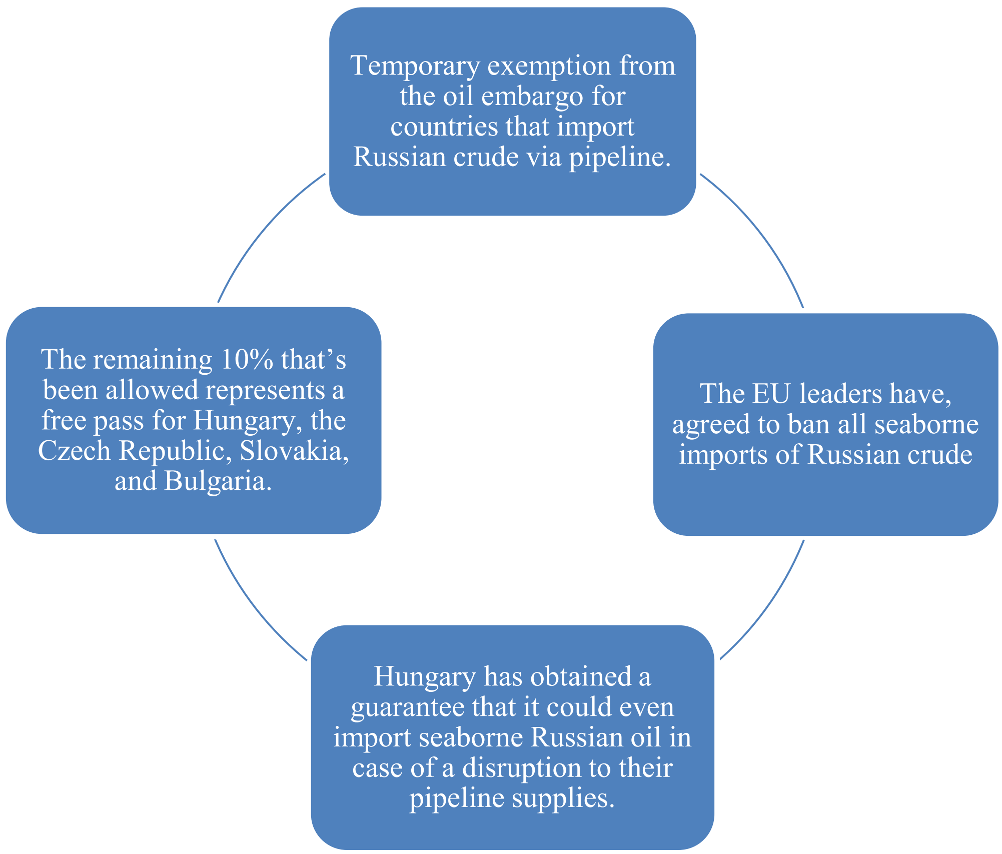
- The proposal to completely phase out Russian crude and refined products from EU territory within a time frame of six to eight months was first mooted by European Commission President in early May.
- A complete import ban on all Russian oil, seaborne and pipeline crude and refined was soughed.

What was the rationale behind such a move?

- The **Russian economy is heavily dependent on energy exports**, with the EU paying billions of dollars every month to Russia for its crude and refined products. The EU wants to block this massive revenue inflow which, as repeatedly pointed out by Ukrainian President, is akin to Europeans bankrolling Russia's war.
- The EU has been attempting, ever since the Ukraine invasion, to build consensus on ways to hurt Russia economically so that it is forced to roll back its military offensive.
- The most obvious route was to stop buying Russian energy, which isn't easy given European households' dependence on Russian oil and gas.
- However, in the context of two long term EU objectives; **reducing fossil fuel dependence in favour of renewables**, and **eliminating dependence on Russian energy for greater strategic autonomy** and energy security member states agreed to make a start by phasing out Russian oil.

What are the terms of the 'compromise deal' that has been agreed upon?

- The main departure from the original proposal is the "temporary exemption" from the oil embargo for countries that import Russian crude via pipeline.
- The EU leaders have, in principle, agreed to ban all seaborne imports of Russian crude, which account for two-thirds of EU's oil imports from Russia. However, with Germany and Poland pledging to phase out even their pipeline imports from Russia by the end of the year, the embargo would eliminate 90% of Russian oil imports.
- The remaining 10% that's been allowed represents a free pass for Hungary, the Czech Republic, Slovakia, and Bulgaria to continue imports via the Druzhba pipeline, the world's largest oil pipeline network.
- Additionally, Hungary has obtained a guarantee that it could even import seaborne Russian oil in case of a disruption to their pipeline supplies. This was deemed a legitimate concession since the pipelines do pass through the war zone in Ukraine.



Why was exemption given for pipeline imports?

- The exemption for pipeline imports was made on the logic that landlocked countries (Hungary, Czech Republic and Slovakia) that are heavily dependent on Russian pipeline oil do not have a ready option to switch to alternative sources in the absence of ports.
- While Hungary imports 65% of its oil via pipeline from Russia, 50% of the Czech Republic's oil imports are Russian, while Slovakia gets 100% of its oil from Russia.
- Bulgaria, which gets 60% of its oil from Russia, is not landlocked. But its refineries at present are only equipped to process Russian crude.
- Until it invests in infrastructure to be able to process non-Russian crude delivered to its ports, it wants to be able to continue importing Russian oil via pipeline and has accordingly claimed the exemption.

Do the exemptions dilute the embargo?

- EU leaders have countered this criticism by pointing out that even a partial (90%) embargo on Russian oil represents tremendous progress in terms of weaning EU off Russian oil.
- Secondly, they have reiterated that even the exemption for pipeline imports is not permanent and will be revisited soon. However, no timeline has been specified for a total ban on pipeline imports.

Are there other elements in the sixth package of sanctions?

- Apart from the oil embargo, the sixth package of sanctions also contains other tough measures against Russia.
- These include **cutting off Sberbank**, Russia's largest bank that holds one-third of Russian banking assets, from the SWIFT messaging system; a **ban on three Russian-owned broadcasting networks** from the EU; sanctions on individuals responsible for war crimes in Ukraine; and a **ban on EU-based firms offering insurance, financing, brokering or any other technical services** related to the transport of oil to Russian ships, a measure aimed at curbing Russia's ability to divert its oil to non-EU destinations.

What about import of Russian gas?

- Compared to Russian oil, Europe's dependence on Russian gas is much greater, and this embargo leaves the import of Russian gas, which accounts of 40% of Europe's natural gas imports untouched.
- In other words, Europe will continue to pay Russia for gas imports. But since crude is more expensive than natural gas, the oil ban is expected to hurt Russian revenues.

How has India responded to these developments?

- India ramped up purchases of Russian crude at discounted prices in the months following the Russian invasion, and this policy is expected to continue.
- The announcement of the EU ban caused an immediate surge in oil prices, and as Europe seeks alternate sources, from West Asia, Africa and elsewhere for its oil needs, prices are expected to stay high.
- In this context, with Russia reportedly offering discounts of $30-35 per barrel, India has found it convenient to make the most of the cheap Russian crude on offer.

Political economy of sugar export curbs

(GS Paper 3, Issues Related to Direct & Indirect Farm Subsidies)

Why in news?

- After the wheat export ban, the government decided to restrict sugar exports, setting a **cap of 10 million tonnes (mt) for the current marketing year** of sugarcane crop.
- India is the world's largest producer of sugar and the No 2 after Brazil.
- The Directorate General of Foreign Trade (DGFT) notified the ban on export of sugar from June 1 beyond the quota limit.

Why this ban has been imposed?

- The key reasons cited are **to ensure domestic availability and price stability** under rising inflationary pressures.
- It is also aimed at orderly trade in the context of ever-increasing export shipments of sugar breaching the previous records of more than 7.2 mt.
- The government is also concerned over the **threat of food crisis caused by supply-chain disruption(s);** hence one dimension of export restriction is also aimed at supplying sugar to countries in economic distress, and friendly nations thus increasing India's diplomatic outreach along with taming speculative trading.

Reason for Imposing Ban

To ensure domestic availability and price stability.	Aimed at orderly trade in the context of ever-increasing export shipments of sugar breaching.	Threat of food crisis caused by supply-chain disruption(s)

Ethanol blending:

- The other reasons for the export ban are, first, the government intends to encourage ethanol blending. India is about to touch the target of 10 per cent ethanol blending, with 9.99 per cent already achieved in March.
- Incidentally, the Union Cabinet amended the National Policy on Biofuels on May 18 by approving the decisions of the National Biofuel Coordination Committee (NBCC).
- One decision is to **advance the ethanol blending target of 20 per cent in petrol to Ethanol Supply Year (ESY) 2025-26 from 203**0.
- India **took a cue from Indonesia and Brazil** which have respectively increased the blending of bio-fuel by 30 per cent and 20 per cent to deal with burgeoning energy prices. In fact, ethanol is cheaper, costing merely around ₹65 per litre in comparison to petrol of around ₹96.
- The export ban is also aimed at **enhancing the use of domestic sugar molasses towards ethanol production**. India has been offering subsidies on export of sugar as the Indian sweetner is priced-out in international markets, thus costing the exchequer.

WTO pressure:

- Moreover, **India has lost a sugar subsidy dispute against Brazil, Australia and Guatemala** in the WTO. The WTO has advised India to withdraw its sugar subsidies as they are not consistent with the WTO Agreement on Agriculture and the Agreement on Subsidies and Countervailing Measures.

Reduce burden of crude oil imports:

- Recognising these challenges, utilising sugar for ethanol will serve two purposes; first, **reducing the burden of ever-increasing crude oil imports** at high prices coupled with **reducing the burden of export subsidy and potential trade dispute(s)** at the WTO.
- There is logic in enhanced production of ethanol as it supports farm income, offers cheaper fuel solution, lower dependency on fossil fuels, and reduces pollution as ethanol is non-toxic and biodegradable.
- Further, it will develop **an eco-system of enhanced production of bio-fuels** thus supporting the farm income, a sector which is widely distressed.

Enhance domestic supplies and reduce inflationary pressures:

- Secondly, the argument that export curbs will enhance domestic supplies and cool inflationary pressures has limited merit as the country's sugar output is expected to touch a record 35.5 mt.
- Further, it is reported to be holding stocks of 6-7 mt from the previous marketing year. India's sugar industry is upbeat on a bumper production with Skymet and IMD predicting a normal monsoon.

- The data of sugarcane sowing from all prime producing States Uttar Pradesh, Maharashtra, and Karnataka vindicates the satisfactory trends, supported by both manual feeding of sowing data and validated by Global Positioning System.

Economic disruptions due to pandemic:

- Thirdly, the export restriction is motivated by external developments such as lower sowing of sugarcane in Brazil due to Covid-19 protocols and associated labour shortages along with harsh weather conditions.
- So the reduced exports from Brazil has increased the demand for Indian sugar in the world market. So, to safeguard domestic availability of sugar the government has opted to limit exports.
- Fourthly, the world economy is passing through a difficult phase with a **series of economic disruptions,** starting from the Covid-19 pandemic, container shortages, escalating freight charges, economic and trade sanctions, financial and commercial boycotts, and **supply chain disruptions caused by the Russia-Ukraine war.**
- All these developments have led to rising **food protectionism around the world,** as major producers curb agricultural exports, adding to the supply shock and enhanced price volatility in the international market.
- Finally, in the current geopolitical scenario, there is a view to move with caution as these commodities (wheat/sugar) can provide us a diplomatic leeway to serve the humanitarian needs of countries that may have to endure extreme supply-shocks.

Way Forward:

- Needless to reiterate, it is an export restriction not a ban, meaning India will continue to cater to genuine requests of supply of sugar up to the prescribed export limit of 10 mt.
- It is a good move to leverage the diplomatic value in the global sugar trade scenario by restricting its supply but India must recognise that its ambition to evolve as a regional power can only be fulfilled if it emerges as a key supplier to the global economy.

Israel ties sharpen India's military edge

(GS Paper 2, Agreements Involving India with other country / GS Paper 3, Challenges to Internal Security)

Context:

- As Israeli Defence Minister Benny Gantz is on an upcoming visit, it becomes essential to analyse the possible contours of coordination between the two countries.

Bilateral relations:

- Bilateral relations with Israel are thirty years old, one aspect of which is that country extending military help to India even during the Cold War period, especially during the 1971 war with Pakistan.
- Its no-strings-attached help with ammunition and laser-guided missiles during the Kargil conflict years later had transformed the battlespace in India's favour.
- The contribution of Israel can be assessed just by **the Phalcon air radar system and the joint production of the Barak missile defence system.**

Enhanced Diplomatic ties:

- Previous governments could not strike a balance between Israel and Palestine and hence always saw Israel from the prism of the Palestinian issue.
- On the other hand, Prime Minister Narendra Modi in 2017 and 2018 visited Israel and Palestine, respectively, and this marked the first-ever visit of India's political leadership.
- In 2018, the then Israeli Prime Minister Benjamin Netanyahu paid an official visit to India. Since then, the relations between the two countries have seen an upward trajectory.

Israel in India's security and the foreign policy:

- The security and the foreign policy acknowledged that **India's pursuit of politico-strategic equilibrium remains incomplete without Israel**.

- Through the multi-alignment policy, India has de-hyphenated its relations with Palestine, and hence has moved much ahead with Israel in terms of cooperation in **counter-terrorism measures, including intelligence sharing and missile supplies.**
- The use of **precision-guided Spice bombs** in the non-military surgical strikes strongly indicates the choice of weapons that Israel can offer to India.

Co-ordination between CIA, Mossad and RAW:

- The Quad Joint Leaders' Statement 2022 condemned the Mumbai and the Pathankot attacks and pledged to take concerted action against all terrorist groups, including those individuals and entities designated pursuant to the UNSC Resolution 1267(1999).
- This is a significant development as the perpetrators of 26/11 continue to be shielded by Pakistan. The statement might indicate a crucial upcoming development.
- Is it possible that the CIA, Mossad and RAW can actively coordinate to use different coercion tools against the terror groups that harmed the joint interests of the three?

Pakistan's proxy war against India:

- Possible coordination between the three agencies is necessary from another perspective. The **recent use of Rocket Propelled Grenade Launchers (RPG) in the Mohali terror attacks** and the findings that the US military hardware left in Afghanistan is now landing in Kashmir expands the horizon of Pakistan's proxy war against India.
- The shrinking foreign exchange reserves and mounting external debtapart from the Baloch and the Tehrik-e-Taliban Pakistan attacks on the military establishment might lead to a full-blown civil war in Pakistan.

- To divert attention, it might resort to terror attacks against the Indian interests to escalate the tensions that might endanger the South Asian peace and security. The next few months are all the more critical for India's security. In such a scenario, India's operational preparedness should be high.

Integration with Israel for new technologies:

- There can be active cooperation between the two countries for **technology transfer or the direct purchase of the Iron Dome Air Defense System** to protect military installations prone to attacks by Pakistan-based proxies.
- Rafael Advanced Defence Systems have developed the Iron dome.

Weapons based on Artificial Intelligence:

- Its Active cooperation with ISRO and DRDO can be sought to collaborate on **futuristic weapons based on Artificial Intelligence** and precise weaponry for external and internal security purposes.
- Israel has also gained expertise in weaponising intelligence where the adversary's military and proxies' build-up are internationally exposed.
- The exposure of the covert 2010 military deployment of Hizbollah and the 2018 secret atomic warehouse in Tehran are examples wherein Israel has actively used its intelligence to avoid escalation. Intelligence weaponisation sends strong signals that the covert operations have been exposed and need to be halted immediately; failing which surgical strikes can soon follow.
- Also, it serves as an essential tool in perception management and psychological warfare, which play an essential role in building up the narratives in the home country and the international community apart from the adversary population.
- Coordination in intelligence can be helpful for India, wherein it can **expose the terror launch pads from across the LOC.** Such measures can also have the sword of being blacklisted in FATF hanging over Pakistan.

Other strategic interests:

- Other strategic interests include intelligence sharing, defence, cyber, and maritime security. From a futuristic perspective, the **emergence of multilateral Mediterranean "security architectures"** has become profound with the discovery of natural gas fields in Israel's Eastern Mediterranean offshore Tamar (2009) and Leviathan (2010), apart from Cyprus's Aphrodite (2011) and Egypt's Zohar (2015).
- The rise of the East Med energy alliance that intends to take natural gas to Europe can be an essential natural gas source for India.

India’s prospective for natural gas:

- If the Abraham accord, which is already in place, can be extended to include Saudi Arabia, the natural gas can be brought to India too via underwater pipelines.
- If all goes well, the alliance between Israel, the U.S., Saudi Arabia and U.A.E. would be in place, and India can join the alliance for its energy and security requirements.
- Last year, the logic of India's strategic alliance axes got a stronghold with the first closed-door virtual meeting between foreign ministers of India, Israel, UAE and the US.
- India is on its path to be a part of the formulation of a structural framework that could be a win-win situation for the regional and the extra-regional players to push back the terror-sponsoring countries apart from the expansionist forces.

U.S. sanctions on Iran & challenges:

- As President Joe Biden has decided to retain the Iranian Revolutionary Guards on the US list of sanctioned terror organisations, it might negatively affect the prospects of a new nuclear deal with Iran. This will lead to the sharpening of the strategic polarisations in India's western neighbourhood, and China's influence over Iran is bound to increase.
- Simultaneous geopolitical convergences between India, Israel and the US to fight terror will also increase the threat factor.
- India and Israel have to be cautious concerning the attempts of the various proxy groups to harm the Israeli diplomats in India.

- For instance, Tal Yehoshua-Koren, wife of the Israeli defence attache to India, was targeted in 2012 while an explosion took place near the Israeli Embassy on the 29th Anniversary of the establishment of the bilateral relations. It is only through joint efforts in human and signal intelligence that such attacks can be averted.

Way Forward:

- Overall, the future is bright for India's overwhelming presence in West Asia.