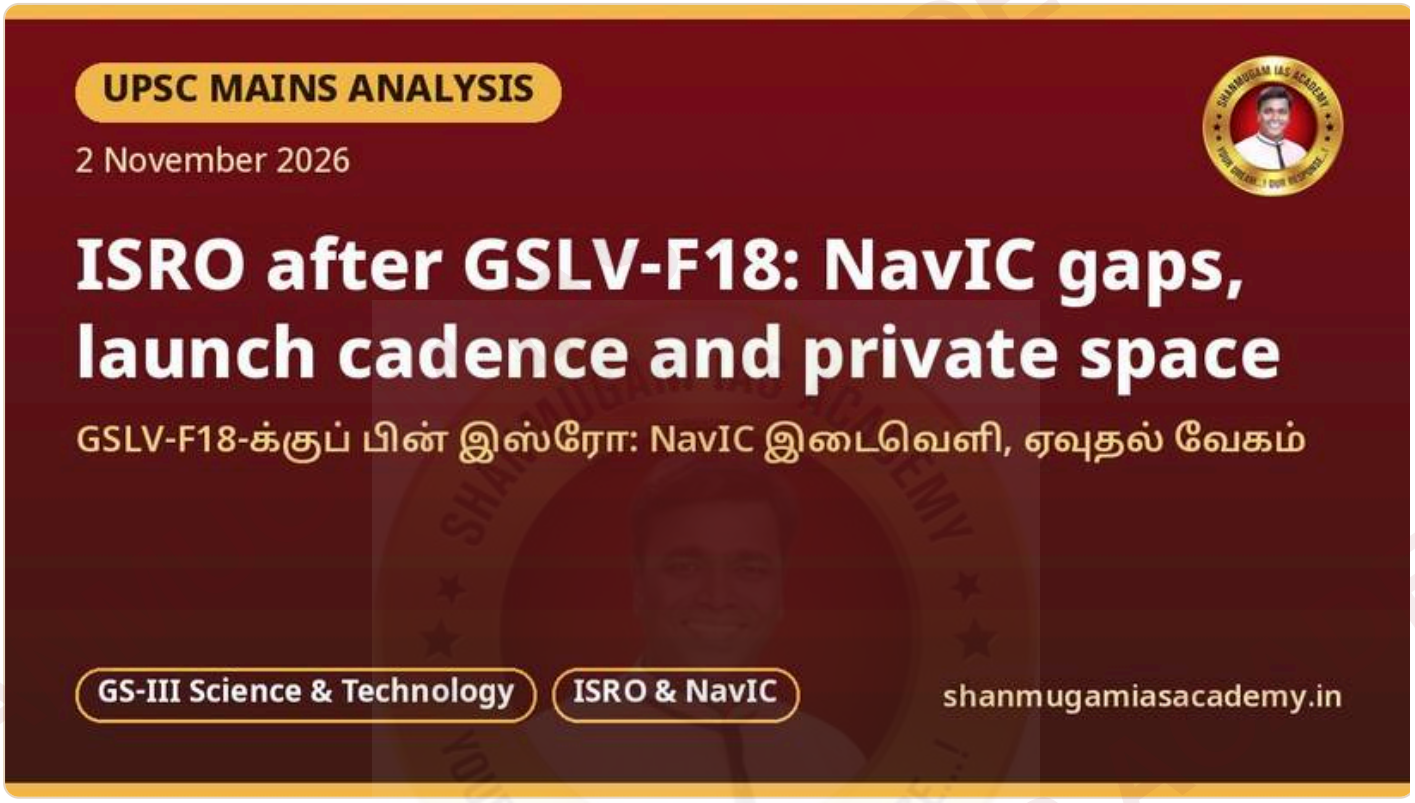
Mains Analysis: After GSLV-F18 – does ISRO have the capacity to match its mandate?

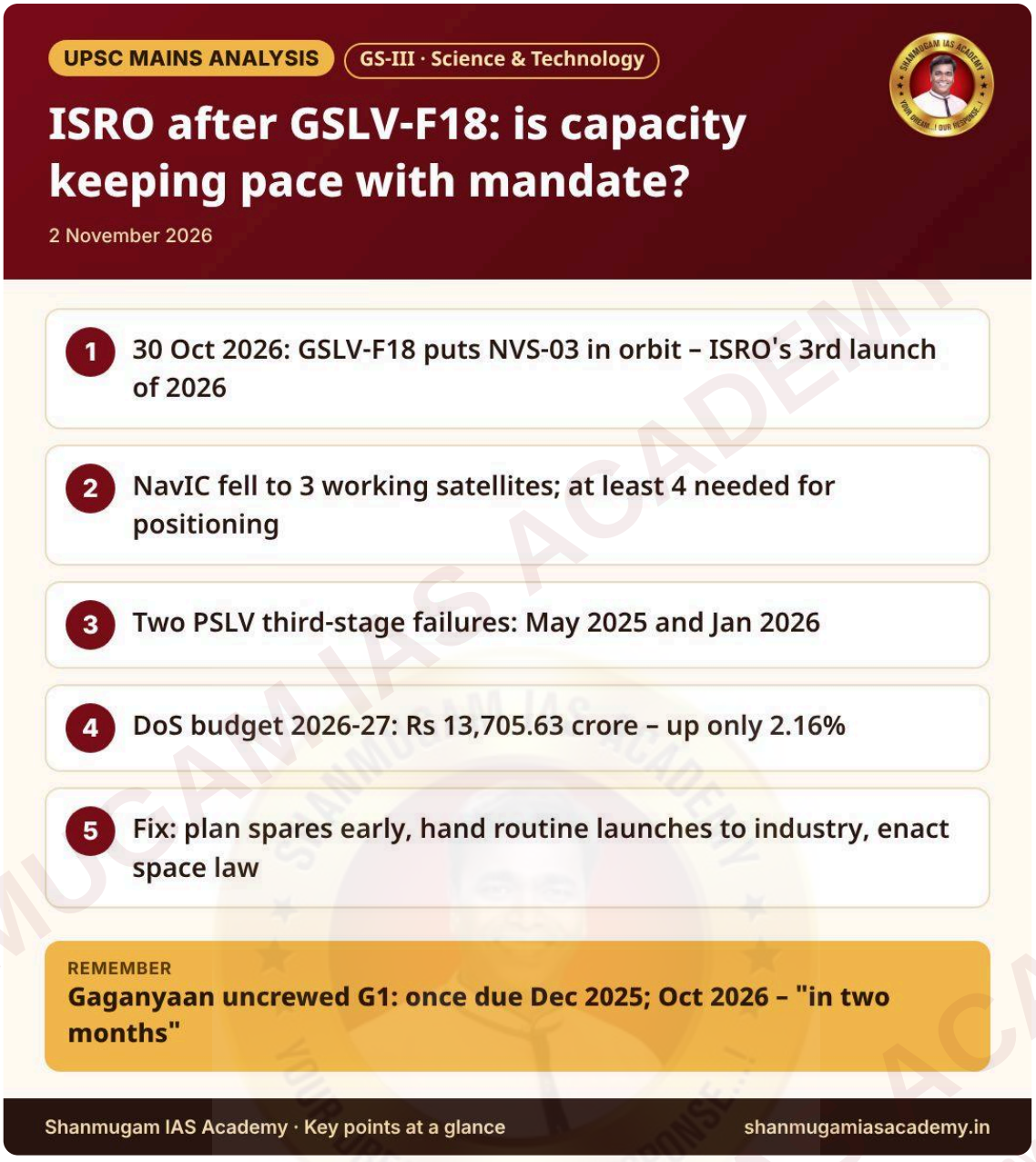
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Context

At **11:51 pm on 30 October 2026**, ISRO's **GSLV-F18** lifted off from the Second Launch Pad at Sriharikota and placed the navigation satellite **NVS-03** in its planned geosynchronous transfer orbit. It was the 20th flight of the GSLV and only **ISRO's third launch of 2026**. The satellite matters more than most: India's own navigation system, **NavIC**, had fallen to **three working satellites** – one short of the four needed to fix a position – after an atomic clock on IRNSS-1F stopped in March 2026. The success is welcome, but it raises a bigger question for the exam: is ISRO's capacity – people, rockets, launch pads, money and industrial partners – keeping pace with a mandate that now runs from navigation and earth observation to human spaceflight and a space station?

> **GS mapping:** GS-III – Awareness in the field of space; achievements of Indians in science and technology; indigenisation of technology; infrastructure; investment models; security (satellite navigation as strategic infrastructure). GS-II – Government policies and institutions (Department of Space, IN-SPACe, NSIL). Also useful for Essay on self-reliance and technology.



Background: NavIC – a system that kept losing satellites

- **Design:** NavIC (IRNSS), approved in 2006, is a **regional** system of seven satellites – three geostationary and four inclined geosynchronous – covering India and about **1,500 km** beyond its boundary. The first satellite, IRNSS-1A, was launched in July 2013.
- **The clock problem:** each satellite needs precise atomic clocks. All three clocks on IRNSS-1A failed in 2016; its replacement IRNSS-1H was lost in August 2017 when the PSLV-C39 heat shield did not separate.
- **Second generation: NVS-01** (May 2023, GSLV-F12) was the first NavIC satellite with an **indigenous atomic clock**. **NVS-02** (January 2025, GSLV-F15) reached transfer orbit but its oxidiser valves did not open, so it could not be raised to its working orbit.
- **Outage:** in July 2026 the Minister of State for Space told Parliament that only **IRNSS-1B, IRNSS-1I and NVS-01** were providing positioning, navigation and timing services; at least four are needed for basic positioning, so NavIC could not give standalone positions, though its timing service continued. NVS-04 and NVS-05 were said to be in an advanced stage.

- **NVS-03:** carries an Indian atomic clock along with procured clocks and adds the **L1** signal – the band used by GPS – to the existing L5 and S-band, which makes NavIC easier to build into ordinary phones and devices.

Launch record, January 2025 – October 2026

Date	Mission	Outcome
29 Jan 2025	GSLV-F15 / NVS-02 (100th launch from Sriharikota)	Rocket worked; satellite stranded in transfer orbit
18 May 2025	PSLV-C61 / EOS-09	Failed – third-stage (PS3) anomaly
30 Jul 2025	GSLV-F16 / NISAR	Success
2 Nov 2025	LVM3-M5 / CMS-03	Success
24 Dec 2025	LVM3-M6 / BlueBird Block-2 (commercial)	Success
12 Jan 2026	PSLV-C62 / EOS-N1 + 15 co-passengers	Failed – third stage again; 16 satellites lost
4 Sep 2026	GSLV-F17 / EOS-05	Success
30 Oct 2026	GSLV-F18 / NVS-03	Success

Eight ISRO launches in 22 months, and three of the first six did not deliver a working satellite to its intended orbit. PSLV – the workhorse – has not flown since January. The report on the 2025 PSLV failure was sent to the Prime Minister's Office but, as reported, has not been made public. The private sector added one flight: Skyroot's **Vikram-1** reached orbit on **18 July 2026**, India's first private orbital launch, using ISRO's pad and test facilities.

Core analysis: mandate versus capacity

Area	Mandate / target	Status (Oct 2026)	Gap
Navigation	Seven-satellite NavIC; L1 for mass use	Three working before NVS-03; NVS-04, 05 pending	Replacements came years late; no spare in orbit
Launch cadence	Rising demand: NavIC, earth observation, Gaganyaan, commercial	Five launches in 2025, three by ISRO in 2026	Two PSLV failures; slow return to flight

Human spaceflight	Gaganyaan; Rs 20,193 crore programme (2024); eight missions by Dec 2028	Uncrewed G1, once due in Dec 2025; in Oct 2026 the ISRO chief said "in two months"	Crewed flight (2027) depends on three uncrewed flights
Space station	BAS-1 module by Dec 2028; full BAS by 2035	Design and studies stage	Timeline rests on Gaganyaan and LVM3 slots
Infrastructure	Third Launch Pad (Rs 3,984.86 crore, 48 months); NGLV (Rs 8,240 crore, 30 t to LEO)	Only two pads; GSLV and LVM3 share one	Pad congestion until new pads are ready
Budget	Department of Space: Rs 13,705.63 crore (2026-27)	Up only 2.16% on 2025-26 BE (Rs 13,416.20 crore)	Flat in real terms while the mission list grows
People	About 14,600 employees (reported)	100+ resignations from key projects reported; DoS tightened exit rules (July 2026)	Vacancies of nearly 30% of sanctioned posts reported
Industry	Space Policy 2023: ISRO to exit routine manufacturing	SSLV technology to HAL (Rs 511 crore); HAL–L&T PSLVs	First industry PSLV reportedly slipped to March 2027

Why it matters

- **Strategic:** satellite navigation is now critical infrastructure for defence, power grids, telecom timing and banking. Depending on foreign systems in a crisis is a risk; a sovereign system is useful only if it stays working.
- **Economic:** the government places India's space economy at about **$8.4 billion**, with a target of **$44 billion by 2033** and nearly 400 space start-ups (PIB, January 2026). That target needs reliable, frequent and affordable launches.
- **Institutional:** the Indian Space Policy 2023 splits roles – ISRO for research and new technology, **IN-SPACe** (2020) to promote and authorise private activity, **NSIL** to commercialise ISRO-built systems. Delays at ISRO now slow the whole ecosystem.
- **Credibility:** foreign customers, co-passenger start-ups and partners judge India by launch reliability; two PSLV failures in eight months hurt.

- **Tamil Nadu link:** GSLV's cryogenic engine is tested at the **ISRO Propulsion Complex, Mahendragiri** (Tirunelveli), and the new SSLV spaceport at **Kulasekarapattinam** (Thoothukudi) is targeted for commissioning in 2026-27.

Challenges

- **Replacement lag:** NavIC satellites were built for about ten years of life, yet replacements arrived late and one (NVS-02) failed – the system had no spare margin.
- **Single points of failure:** PSLV shares stages and parts with other rockets; one solid-motor problem grounds the busiest launcher.
- **Too many priorities, flat money:** Gaganyaan, BAS, NGLV, Chandrayaan-4 and operational satellites compete for the same engineers, budget and pads.
- **Talent drain:** private space firms now hire ISRO-trained engineers; tightening exit rules treats the symptom, not pay, career paths or workload.
- **Slow hand-over to industry:** industry-built PSLVs and SSLVs are not yet flying regularly, so ISRO still does routine production.
- **Legal gap:** the **Space Activities Bill**, drafted since 2017 and re-drafted in 2025, is still not law – liability, licensing and insurance rest on policy, not statute.
- **Transparency:** failure reports that are not published make it hard for Parliament and partners to judge whether fixes are sound.

Way forward

1. **Constellation planning:** build and store NavIC spares in advance; launch replacements before satellites reach end of life, not after.
2. **Publish failure reports** (with security edits) and fix a firm PSLV return-to-flight plan.
3. **Real hand-over:** let NSIL and industry run PSLV, SSLV and routine satellites on fixed-price contracts, so ISRO focuses on Gaganyaan, NGLV and science.
4. **Enact the Space Activities Law** to give IN-SPACe statutory powers, clear liability and quicker licences.
5. **Money with milestones:** multi-year funding for flagship missions, linked to published milestones reviewed by Parliament.
6. **People:** fill vacancies faster, add technical career tracks and allow two-way movement between ISRO and industry instead of blocking exits.
7. **Infrastructure:** complete the Third Launch Pad and Kulasekarapattinam on time to remove pad congestion.

> **Conclusion:** GSLV-F18 shows that ISRO can still deliver when it matters. But a mandate that has grown from launching satellites to keeping constellations alive, flying humans and building a station cannot run on the capacity of the last decade. The answer is not to do everything inside ISRO, but to plan replacements early, hand routine work to industry, and give the sector a law, people and funding that match its ambitions.

Mains practice question

Q. The NavIC outage of 2026 and repeated launch-vehicle setbacks raise questions about ISRO's capacity to fulfil its expanding mandate. Examine, and suggest how the private sector and institutional reforms can help. *(15 marks, 250 words)*

Answer framework: Introduction – GSLV-F18/NVS-03 (30 Oct 2026) and NavIC at three working satellites · Body – (a) mandate: navigation, earth observation, Gaganyaan, BAS, NGLV; (b) capacity gaps: launch record 2025–26, PSLV failures, replacement lag, flat budget (Rs 13,705.63 crore), talent drain, two launch pads; (c) role of private sector: Space Policy 2023, IN-SPACe, NSIL, FDI rules (2024), Vikram-1, SSLV transfer to HAL; (d) reforms: Space Activities law, published failure reports, milestone funding · Conclusion – faculty-view line.

Prelims pointers

- NavIC signals: L5 and S-band; NVS series adds L1. Coverage: India + about 1,500 km.
- NVS-01 (2023) – first NavIC satellite with an indigenous atomic clock.
- FDI in space (2024): satellites up to 74%, launch vehicles and spaceports up to 49%, components up to 100% under the automatic route.
- IN-SPACe – space regulator and promoter (2020); NSIL – public sector undertaking under the Department of Space.
- Vikram-1 (Skyroot Aerospace) – first private orbital launch from India, 18 July 2026.

Asked before in UPSC Mains (PYQ)

Official question-paper wording, with how this analysis helps you answer it.

GS-III 2015 12.5 marks

"What do you understand by 'Standard Positioning Systems' and 'Protection Positioning Systems' in the GPS era? Discuss the advantages India perceives from its ambitious IRNSS programme employing just seven satellites."

How this helps: Use the NavIC story as it stands in 2026: why a seven-satellite regional system was chosen, why it fell below four working satellites, and how NVS-03 (L1 signal, Indian clock) restores it.

GS-I 2018 10 marks

"Why is Indian Regional Navigational Satellite System (IRNSS) needed? How does it help in navigation?"

How this helps: The 2026 outage is the strongest answer to "why needed": a navigation system you own is useful only if it is kept working – cite the July 2026 Parliament reply (only three working satellites).

GS-III 2019 10 marks

"What is India's plan to have its own space station and how will it benefit our space programme?"

How this helps: Update the plan with the approved timeline – BAS-1 module by December 2028, full station by 2035 – and show that it depends on Gaganyaan uncrewed flights that have slipped from 2025.

Faculty view – looking ahead (Shanmugam IAS Academy)

The lesson of NavIC is not that India cannot build satellites – it can. It is that a space power is judged by **"assured access to space"**: the ability to put the right satellite in orbit when it is needed, with a backup rocket, a spare satellite and a free launch pad. India built firsts but not enough depth. The next five years will test whether ISRO becomes a research agency that lets industry run routine launches.

- **Concept to use:** "assured access to space" – in any answer on ISRO, NavIC, defence space or private launchers.
- **What to watch next:** (1) NVS-03 reaching its slot and NavIC positioning restored, then NVS-04 and NVS-05; (2) PSLV return to flight and the first industry-built PSLV; (3) Gaganyaan G1 and the 2027 crewed target; (4) the Space Activities Bill in Parliament.
- **Ready-made conclusion line:** "Firsts make headlines; replacements make a space power – India must plan its satellites, rockets and people for continuity, not just for launch day."

Sources: ISRO – GSLV-F18/NVS-03 mission page and brochure; ISRO launch-missions list; ISRO and PIB releases on the Third Launch Pad (16 Jan 2025), NGLV (18 Sep 2024), Gaganyaan/BAS (18 Sep 2024) and the IN-SPACe venture fund (24 Oct 2024); Indian Space Policy 2023 (Business Standard); reports on NavIC and the July 2026 Parliament reply (The Week, Swarajya, ETV Bharat, WION); PSLV-C62 (NASASpaceflight, The Week, Business Today); Vikram-1 (ISRO, Al Jazeera); Gaganyaan timelines (All India Radio, ETV Bharat, UNI, Starlust); Budget 2026-27 (Business Today, ETV Bharat); staffing (Business Today, Swarajya, People Matters); FDI rules (EY). Original analysis by Shanmugam IAS Academy.

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