GSAT-6A Launch by GSLV F08

Why in news?

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The GSLV F08 launched the GSAT 6A communication satellite into its orbit, from the Satish Dhawan Space Centre at Sriharikota.

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What is GSAT-6A for?

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- GSAT-6A, similar to its predecessor GSAT-6, is a high power **S-band communication satellite**.
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- It has a mission life of around **10 years**.
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- The satellite has a **six-metre wide antenna** that would unfurl once it is in space.
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- The antenna, meant for **S-band communication**, is 3 times broader than those generally used in ISRO satellite.
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- This feature facilitates mobile communication for the country through **handheld ground terminals**.
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- The smaller antenna in other communication satellites requires larger ground stations.
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- The GSAT-6A is intended to provide communication services through **multibeam coverage**.
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- The satellite would also provide services to the Indian **Armed Forces.**
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- The GSAT-6A was successfully placed in **GTO** (Geo-stationary Transfer Orbit).
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- Soon after separation from GSLV, the two solar arrays of GSAT-6A were

automatically deployed in quick succession.
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- The **Master Control Facility** (MCF) at **Hassan** in Karnataka assumed control of the satellite.
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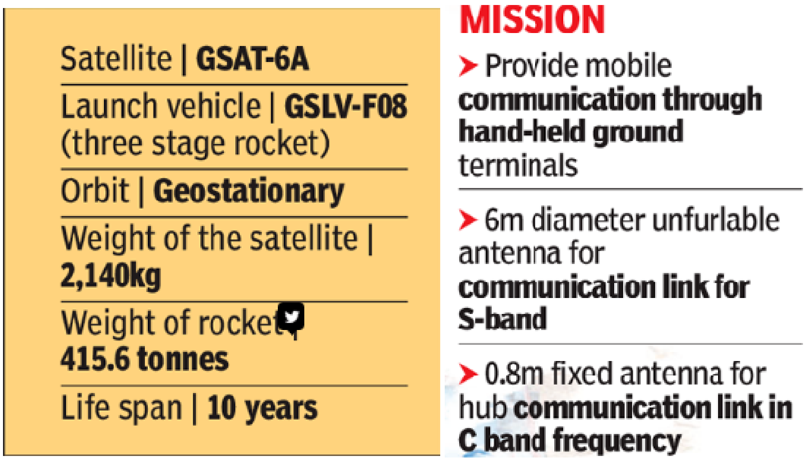

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What is the significance?

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- **Launch** - The launch took ISRO a step towards realising its second Moon mission Chandrayaan 2 planned for October 2018.
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- The launch was the 12th satellite launched on board the GSLV rocket.
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- This is the fifth consecutive success for a GSLV equipped with an indigenously developed **Cryogenic Upper Stage engine**.
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- **GSLV** - The GSLV F08 is an improved and a fully operational version of ISRO’s heavy-lift GSLV Mk II rocket series.
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- The GSLV, specifically the GSLV F10, is the designated rocket to fly India’s second mission to the Moon, the Chandrayaan 2.
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- In the absence of heavy-lift rocket technology, India has been relying on France for launching its communication satellites.
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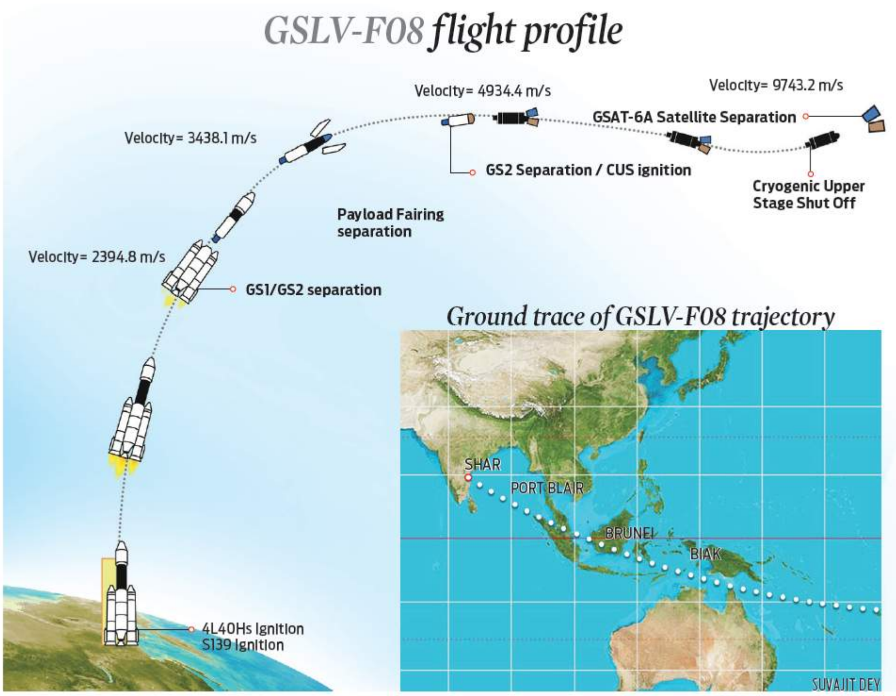

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- **Vikas Engine** - Vikas engine powered the rocket's second stage.
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- The performance of the vehicle is enhanced with an improved Vikas engine.
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- The improved engine has increased the thrust by 6%, thereby enhancing payload capability of the vehicle by 50%.
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- The second stage also had electromechanical actuation system replacing electrohydraulic actuation system.
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- This is to enhance the reliability of the rocket.
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- These improvements to the vehicle would be incorporated into GSLV's future missions, including Chandrayaan-2.
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Why is the cryogenic stage significant?

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- The indigenous cryogenic stage on the GSLV is the third stage, and uses liquid hydrogen as fuel and liquid oxygen as oxidiser.
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- **Challenge** - Cryogenic engine uses propellants at extremely **low**

temperatures.
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- The resultant and associated thermal and structural problems make cryogenic stage a very complex system.
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- **Benefits** - Cryogenic engines provides more thrust for every kg of propellant it burns.
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- It is a highly efficient rocket stage as the efficiency is better when compared to solid and earth-storable liquid propellant stages.
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- Cryogenic engines also keep fuel loads relatively low.
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- **GSLV** - Cryogenic engines provide unprecedented thrust to GSLV rockets in their final stages.
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- Nearly 50% of the power for GSLV rockets as they push into space comes from the cryogenic stage.
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How did the cryogenic technology evolve in India?

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- India had first ventured on the path of obtaining cryogenic technology in 1992.
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- It had a two-pronged strategy of purchasing cryogenic engines from Russia, and acquiring the technology from the US.
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- But following the 1998 nuclear tests and the sanctions that followed, the US denied India cryogenic technology.
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- ISRO used 7 cryogenic engines sold by Russia for the early phase of its GSLV programme that began in 2001.
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- Parallelly, India ventured into developing an indigenous technology.
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- GSLV launches with Russian engines, including early operational flights, had mixed results, with only 2 flights going perfectly to plan.
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- The first GSLV flight with an indigenous cryogenic upper stage failed on April 15, 2010.

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- But India is now among 6 nations, along with the US, Russia, France, Japan and China, to possess cryogenic engine technology.

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What lies ahead?

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- ISRO is still in the process of developing a fully operational GSLV Mk III rocket.
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- This can carry satellites weighing more than 4 tonnes to space.
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- The cryogenic upper stage in the GSLV Mk III rocket uses the C25 engine.
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- This is an improvement on C20 cryogenic engines used in the GSLV Mk II rockets.
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- A GSLV Mk III D2 rocket is scheduled to fly a GSAT 29 communication satellite to space in its second mission soon in the year.

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Source: Indian Express

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