

GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE

RAJYA SABHA

**UNSTARRED QUESTION NO. 3008**

TO BE ANSWERED ON THURSDAY, AUGUST 13, 2026

**UTILIZATION OF SEMI-CRYOGENIC ENGINE**

3008. DR. MEDHA VISHRAM KULKARNI:

Will the PRIME MINISTER be pleased to state:

- (a) whether the recent successful semi-cryogenic engine power head test has advanced India's capability to future human spaceflight and deep-space missions;
- (b) if so, the details thereof;
- (c) whether the semi-cryogenic engine is proposed to be utilized in future launch vehicles supporting Gaganyaan, Chandrayaan-4, Chandrayaan-5 and other heavy-lift missions;
- (d) the present status of integration planning and technology validation for such missions; and
- (e) the timeline envisaged for operational deployment of the technology in India's next-generation launch systems?

**ANSWER**

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC  
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE  
(DR. JITENDRA SINGH):**

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(a) & (b)

Yes. The recent successful testing of the Power Head Test Article for the 2000kN semi-cryogenic engine at a thrust level of 88% is a major milestone in the indigenous development of Semi-cryogenic engine, which has given sufficient confidence to proceed towards the demonstration of steady state performance of engine powerhead at 200 tonne (100%) thrust level. Further, the qualification of the fully integrated semi-cryogenic engine will ensure self-reliance in high thrust liquid propulsion engines.

- (c) The Chandrayaan-4 Sample Return Mission proposes to utilize the LVM3 launch vehicle incorporating the Semi-cryogenic engine. The Gaganyaan missions will be launched with human rated version of LVM3 with core liquid stage (L110). The need for Semi-Cryogenic engine does not arise for Chandrayaan 5 mission, as it is a joint mission with JAXA, wherein ISRO will develop the lander and launch is under the scope of JAXA.
- (d) All the engine subsystems have been successfully realized except one subsystem i.e. thrust chamber, which is taking some more time to fabricate, owing to its significant complexity. As of now, the Power Head Test Article consisting of all the integrated engine subsystems except the thrust chamber have been tested up to 88% thrust level and further activities are in progress towards the demonstration of steady state performance of engine powerhead at 200 tonne (100%) thrust level.
- (e) The next generation launch systems are based on LOX/Methane engines and does not require the Semi-cryogenic engine.

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